

U.S. Department of Homeland Security | Science and Technology Directorate

Remote Identity Validation Tech Demo Challenge



**Science and
Technology**

Yevgeniy Sirotin and John Howard
Identity and Data Sciences Laboratory at
the Maryland Test Facility (MdTF)

Arun Vemury
Lead
Biometric and Identity Technology Center
DHS Science & Technology Directorate

June 2023

[SCIENCE AND TECHNOLOGY DIRECTORATE]

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.





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



Remote Identity Validation Tech Demo (RIVTD)

- Industry has developed new tools to authenticate documents and verify the identity of users remotely:
 - Remote Identity Validation (RIV)
- Difficult for industry to test the effectiveness and fairness of these systems:
 - Hard to obtain large samples of genuine documents and their owners
 - Testing for demographic differentials is costly
- DHS S&T is interested in understanding the current performance of RIV and help industry to develop more secure, accurate, and equitable technologies.

2023 Remote Identity Validation Technology Demonstration (RIVTD)

- DHS S&T is looking for full RIV systems and/or component technologies that are capable of:
 1. Assessing the validity of an identity document (US driver's license)
 2. Matching a “selfie” photo to the photo on the Identity Document
 3. Assessing the “liveness” of the “selfie” photograph
- DHS S&T encourages providers of technologies that can perform any portion of the RIV process to apply to participate in this demonstration
- The demonstration will follow a phased approach such that each step in the RIV process will be demonstrated separately



Technology Demonstrations

- Demonstrations are a distinct evaluation performed by DHS S&T
 - Allows DHS S&T to survey the current state of technology
 - Provides technology providers an opportunity to:
 - Demonstrate their capabilities to government and private sector stakeholders
 - Collaboratively evaluate technologies with DHS S&T
- Quantitative results of the Remote Identity Validation Technology Demonstration will be shared within the government and with participating companies.
- Select insights may be shared publicly in a manner that preserves the anonymity of the companies that participated.

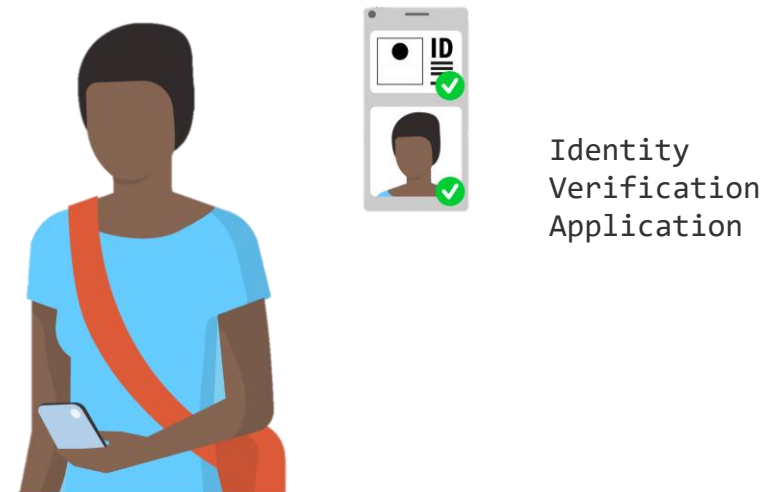
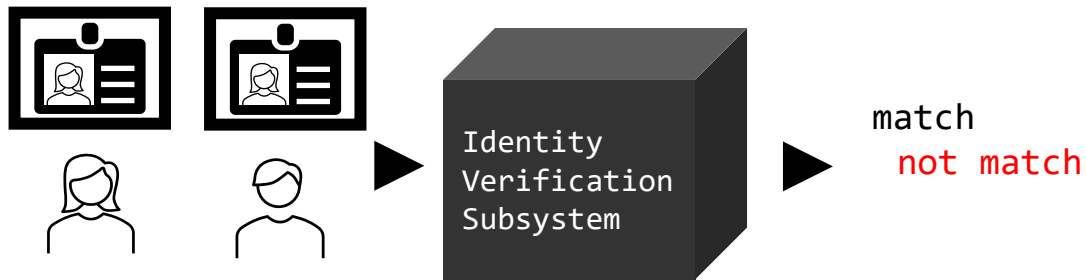
Technology Tests vs. Scenario Tests

- Technology Testing:

- Focus on performance of a single identity subsystem (e.g., identity document verification)
- Use sequestered image datasets
- Easily repeatable

- Scenario Testing:

- Assess performance of identity application in the context of use
- Real people interact with the system
- Costly to repeat

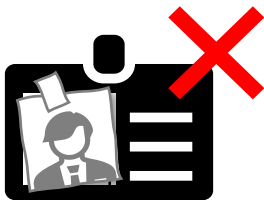


i RIVTD will begin with technology testing using sequestered images

RIVTD Tracks

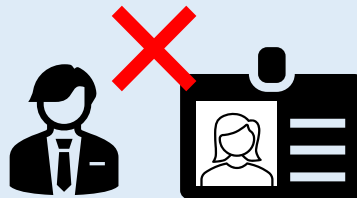
Track 1: ID Validation

- Information Check
- Tamper Check
- Security Check



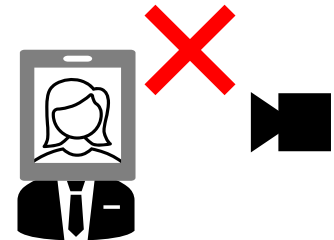
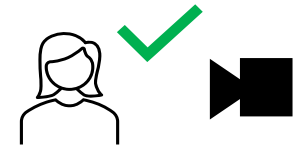
Track 2: Match to ID

- 1:1 Verification



Track 3: Liveness and Presentation Attack Detection (PAD)

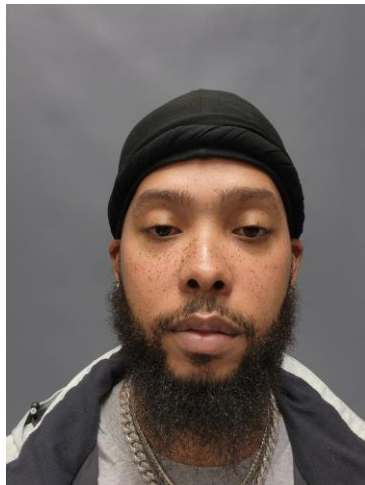
- Reject screens and printouts
- Reject masks and other fakes



Current focus is Track 2: Match to ID

Track 2: Identity Document (ID) Verification

- In March of 2023, DHS S&T collected a large sample of U.S. person ID cards (e.g., driver's licenses) and selfie images.
- RIV systems will demonstrate their ability to determine if a **selfie image** is the same person as pictured on a **U.S. identity document**.
- Selfies:



- U.S. Driver's License:



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? \(wbaltv.com\)](https://www.wbal.com/news/what-do-the-new-maryland-driver-s-licenses-look-like/)

All volunteers shown here consented to have their images used in government presentations.

Identity Document – Image Properties

- Genuine document images, controlled and uncontrolled selfies
- Images captured with a selection of mobile phones
- JPEG or PNG encoding
- Reasonable efforts to ensure quality
- Optical perspective distortions may be present
- Images provided as base64 encoded strings



Apple iPhone 14



Google Pixel 7

MdTF Match-to-ID 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 Biometric Technology Rally matching system API

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](#)

Copyright (c) 2023, The Maryland Test Facility

Biometric Operations ^

- POST** `/v1/create-template` Generate a template from the provided facial biometric sample or the identity document image. v
- POST** `/v1/compare-list` Compare a single template to a list of target templates. v

Algorithm Information ^

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

Match-to-ID 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**
 - Vendors must distinguish and act accordingly.

```
{  
  "ImageData": "iVBORw0KGgoAAAANSUhEUgAAAAEAAAABCAIAAACQd1PeAAAAEE1EQVR4nGJiYGAABAAA//8ADAADcZGLFwAAAABJRU5ErkJggg=="  
}
```



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



```
{  
  "Template": "dGhpcyBzZW50ZW5jZSBpcyBhbiBleGFtcGx1IHRlbXBsYXR1Li4K"  
}
```

Match-to-ID 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": "dGhpcyBzZW50ZW5jZSBpcyBhbiBleGFtcGx1IHR1bXBsYXR1Li4K"
  },
  "TargetTemplateList": [
    {
      "Template": "dGhpcyBzZW50ZW5jZSBpcyBhbiBleGFtcGx1IHR1bXBsYXR1Li4K"
    }
  ]
}
```



POST

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

(this is a JSON list)

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

Match-to-ID API, Algorithm Info

- `/v1/info` (GET)

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"
  }
}
```

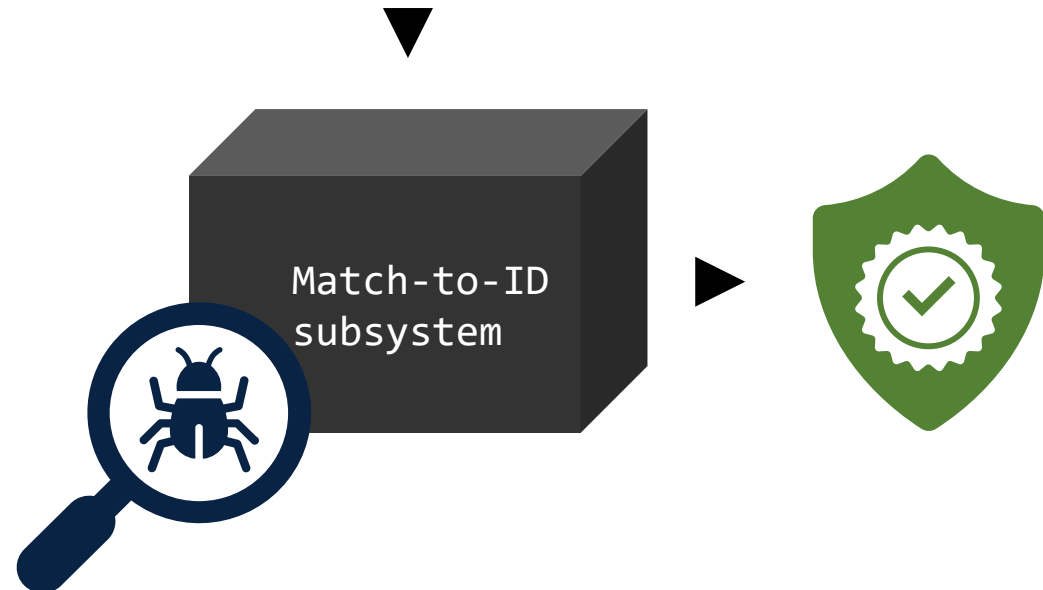
Thresholds are used in the evaluation of your algorithm, set them appropriately

Identity Verification Subsystem

- MdTF ID Validation API will be implemented via an **HTTP server**
- Deployed inside a **docker** container
- Delivered via a .tar/.tgz uploaded to a **web portal** (credentials required)
- Docker containers will be required to run on government systems and will be assessed for **security**.



```
docker save ${COMPANY_NAME}-rivtd-track2-system:latest |  
gzip > ${COMPANY_NAME}-rivtd-track2-system.tgz
```



We will work with vendors to address security requirements

Identity Verification 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 **1.5 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 1 year from the RIVTD Track 2 submission deadline

Match-to-ID Metrics

- **Probe Failure to Process Rate (PFPR)** – proportion of selfie images that fail to produce a template
- **Document Failure to Process Rate (DFPR)** – proportion of document images that fail to produce a template
- **False Non-Match Rate (FNMR)** – proportion of ID document templates that do not match to templates from mated selfie images
- **False Match Rate (FMR)** – proportion of non-mated templates that match – for validation of supplied thresholds
- **Disaggregated by factors of interest :**
 - Threshold
 - Smart phone type
 - Demographics
 - Selfie level of control

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. Remote identity verification technology capabilities
 3. System inputs and data processing steps
 4. System outputs
 5. Description of the complexity and maturity of the remote identity validation system, including any active deployments.
 6. Any measurements of the performance characteristics of the system and how they were tested
- Optional demonstration video of system functionality.
- Submit application package to RIVTD@mdtf.org by **11:59pm (EST) June 22, 2023**



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



Questions & Answers

- Contact information
 - peoplescreening@hq.dhs.gov
- 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>



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