U.S. Department of Homeland Security

SCIENCE AND TECHNOLOGY DIRECTORATE

Remote Identity Validation Rally (RIVR) Identity Document Validation (IDV) Results Webinar

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Agenda

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- Remote Identity Validation Rally (RIVR)
- RIVR: Identity Document Validation Evaluation
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  - System Requirements
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- RIVR: Identity Document Validation Results
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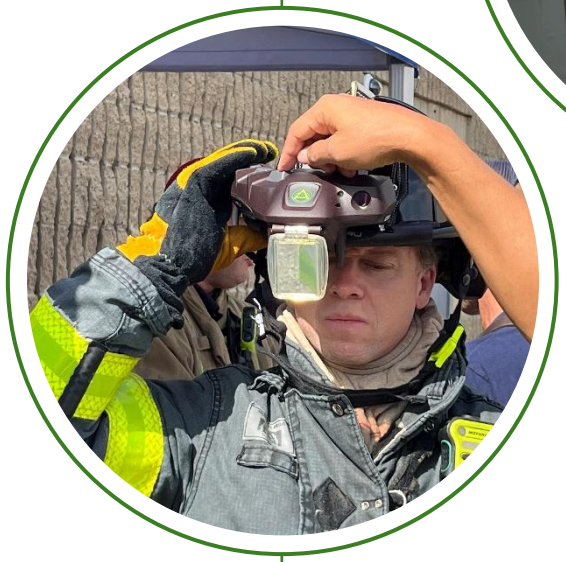
Operationalizing science and technology.

The Science and Technology Directorate (S&T) researches, develops, tests, and evaluates solutions needed to meet the growing demands of our nation's homeland security officials.

- We capture specific mission needs.
- We deliver impactful technology solutions.
- We conduct independent test and evaluation.



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Biometric & Identity Technology Center

The Science & Technology Directorate (S&T) conducts foundational research to ensure advancements in science and technology are harnessed in the development of cutting-edge solutions to new and emerging operational challenges.

- Drive biometric and identity innovation at the Department of Homeland Security (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 across industry and academia

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
- Industry performance benchmarks are not well defined, making it is difficult for organizations to test the effectiveness of these systems
- S&T is studying the current performance of RIV to help industry develop more secure, accurate, and robust technologies:
  - Remote Identity Validation Technology Demonstration (RIVTD) from 2023 to 2024
    - Comprehensively demonstrated performance of commercial RIV subsystems
    - Informed NIST digital identity guidelines
    - Identified metrics, performance gaps, and achievable performance benchmarks
  - Remote Identity Validation Technology Rally – currently ongoing

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 can 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

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Identity Document Validation Track Process & Requirements

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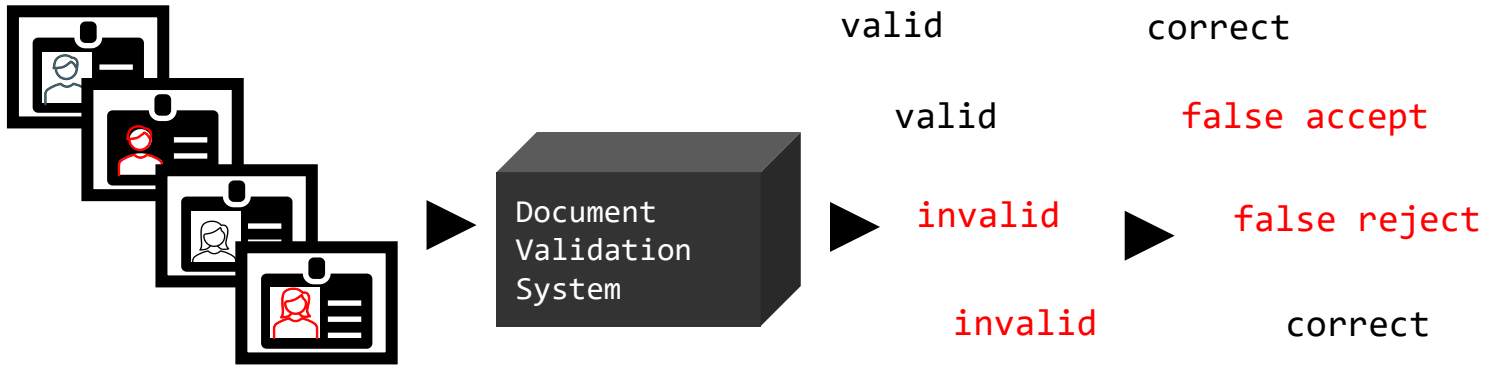
Data Used

- Leveraged a large and growing collection of:
  - Images of genuine U.S. State-issued ID cards (e.g., driver's licenses)
  - Fraudulent IDs collected from the DHS HSI Forensic Laboratory
- RIV Document Validation Subsystems (DVSs) were evaluated based on their ability to determine if a **U.S. State-issued ID card** is genuine or fraudulent.

- System Combination:



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Genuine Document Dataset Composition

- Images of genuine documents were collected from volunteers under informed consent
- A total of 2,032 genuine documents were collected between 2023 and 2025
- Test staff collected both front and back images of fraudulent documents using each of three smartphones
  - All documents were validated using a multi-spectral government ID validation tool

State	N	State	N	State	N	State	N
AZ	7	GA	2	MI	2	PA	8
CA*	1,298	IL	1	MO	2	TX	6
CO	2	KS	1	MT	2	UT	2
CT	1	KY	1	NV	1	VA*	97
DE	1	MA	3	NY	5	WA	3
FL	2	MD*	526	OR	2	DC*	55
						Total:	2,032

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Sample Images Across Collection Methods and Devices

- Genuine document images were acquired on each of three smartphones. Data collection included images with and without mild perspective distortion:

*Volunteers consented to have images used in government presentations. ID documents redacted to protect privacy.

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Fraudulent Document Dataset Composition

- Images of fraudulent documents were collected in partnership with the DHS HSI Laboratory
- A total of 1,938 fraudulent documents were included in this evaluation
- Test staff collected images of both the front and back of each fraudulent document using the same smartphones used for genuine documents
- Fraudulent document states of issue included all 50 states as well as the District of Columbia

Participating Systems

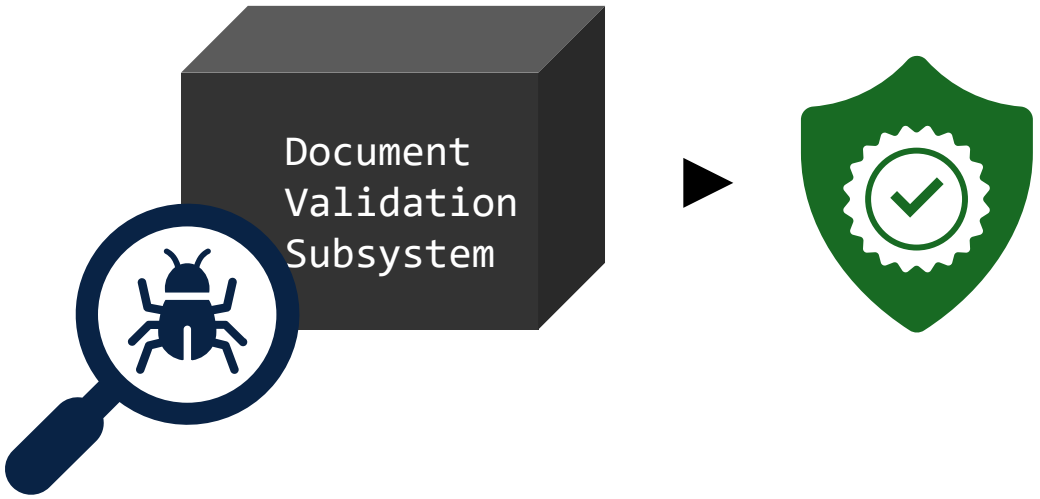
- 7 commercial Document Validation Subsystems (DVSs) participated in RIVR
  - Announced in July 2025
  - Applications due in July 2025
  - Submissions due in August 2025

- Representative of the state of the industry

- Each system was given a unique alias (DVS 1, DVS 2, etc.)

System Requirements

- Implement the MdTF Document Validation Application Programming Interface (API)
- A single Linux-based docker container
  - HTTP server on port 8080
  - Less than 5 GB in size
- Pass strict security assessments for deployment to government systems
- No outside functionality and no access to the internet
- Systems were evaluated on both government and non-government systems



Identity Document Validation Metrics

- **System Error Rate (SER)** – Proportion of documents for which the document validation subsystem returned an error message indicating the document failed to process
  - **Threshold: 0.10, Goal: 0.01**
- **Document False Reject Rate (DFRR)** – Proportion of genuine documents which the document validation subsystem either returned a system error or determined to be invalid
  - **Threshold: 0.10, Goal: 0.01**
- **Document False Accept Rate (DFAR)** – Proportion of fraudulent documents which the document validation subsystem determined to be valid
  - **Threshold: 0.10, Goal: 0.01**
- **Disaggregated to examine robustness for:**
  - Document state of issue
  - Smartphone type

RIVR set performance benchmarks for each metric:
Threshold – maximum high-performance error rate
Goal – target high-performance error rate

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Identity Document Validation Track Results

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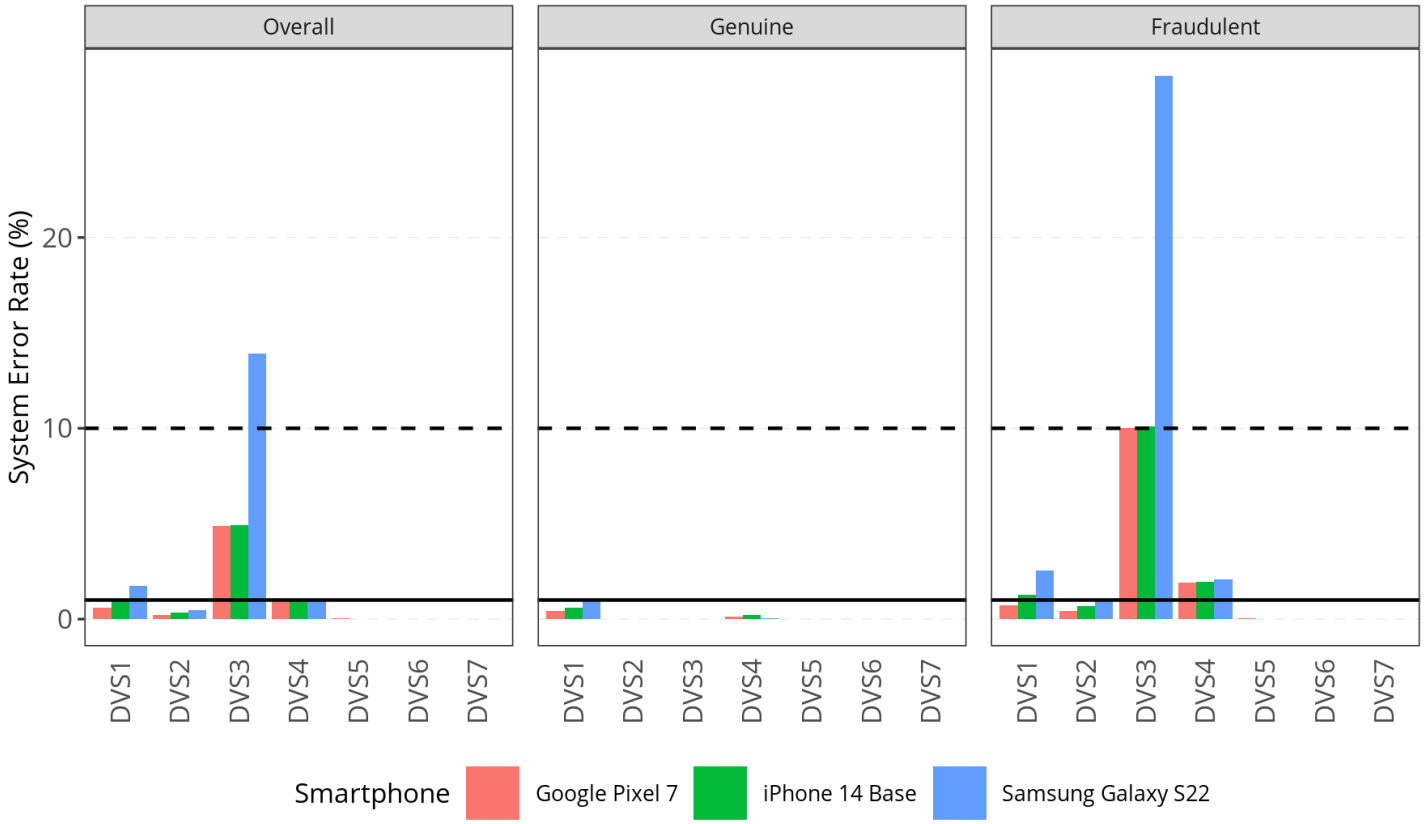
Methodology

- Document validation subsystems were evaluated in combination with different smartphones and disaggregated for different genuine document states of issue
  - The sample size was sufficient for disaggregation for CA, DC, MD, and VA
- Evaluation metrics were computed separately for each DVS smartphone pair, referred to as a system combination
- Overall performance for each tested system was assessed based on the maximum error rate value observed for each metric across the three smartphones
- A “failure is suspicious” policy was used to calculate document validation errors
  - A system error on a genuine document is considered a false rejection
  - A system error on a fraudulent document is **NOT** considered a false acceptance

System Error Rates



Bars correspond to performance of combinations of smartphone and DVS. Area below the black line indicates 1% or lower SER. Area below the dashed black line indicates 10% or lower SER.

- **Most systems performed well**
  - 4 of 7 DVS maintained overall SER below 1%
  - 6 of 7 DVS maintained overall SER below 10%
- **Error rates on fraudulent documents were higher**
- **Smartphone devices can affect performance**
  - DVS 3's SER was three times higher on the Samsung device as compared to the iPhone and Pixel

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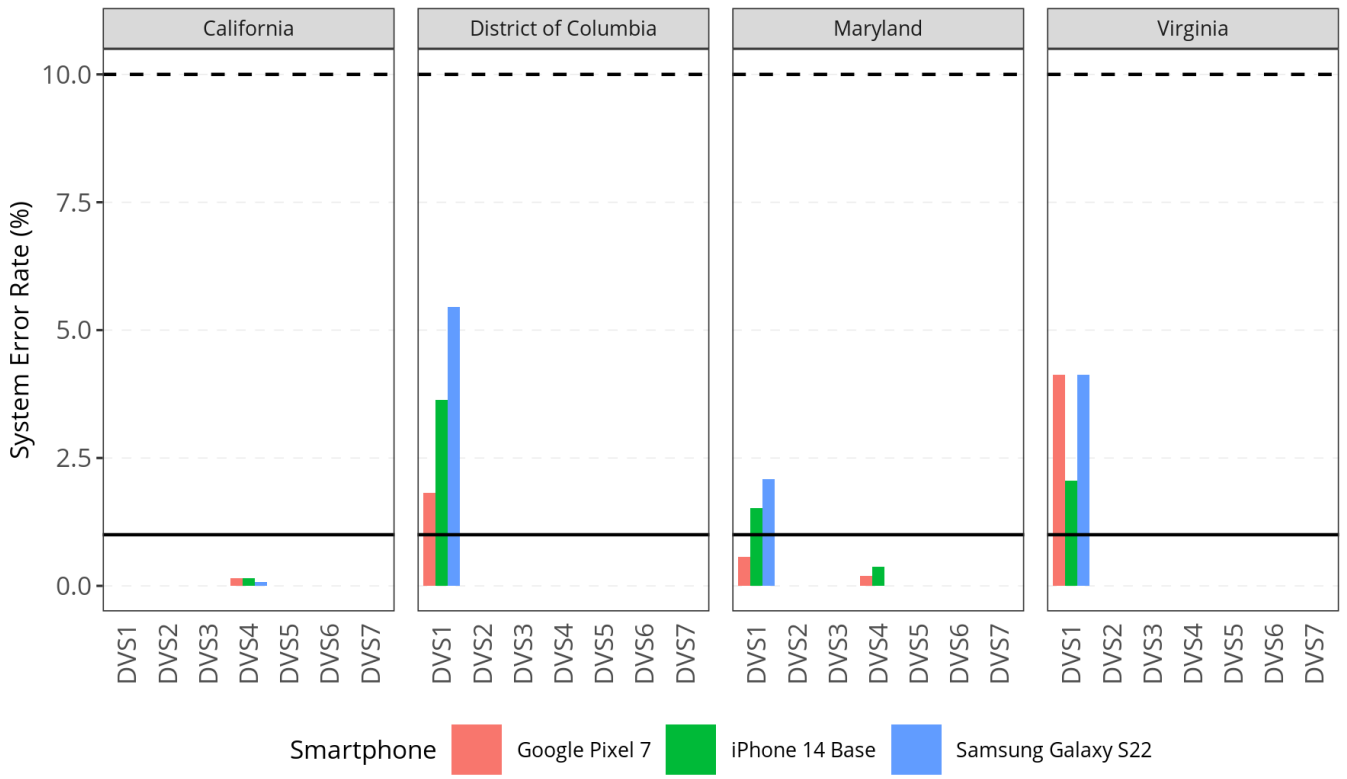
State of Issue: Genuine System Error Rates



Bars correspond to performance of combinations of smartphone, states of issue, and DVS. Area below the black line indicates 1% or lower genuine SER. Area below the dashed black line indicates 10% or lower genuine SER.

- **Most DVS maintained low SER for different states of issue**
  - 6 of 7 DVS maintained genuine SER below 1%
- **Document state of issue can affect DVS performance**
  - DVS 1 had elevated SER for DC, MD, and VA documents
  - DVS 4 had elevated SER for CA and MD documents

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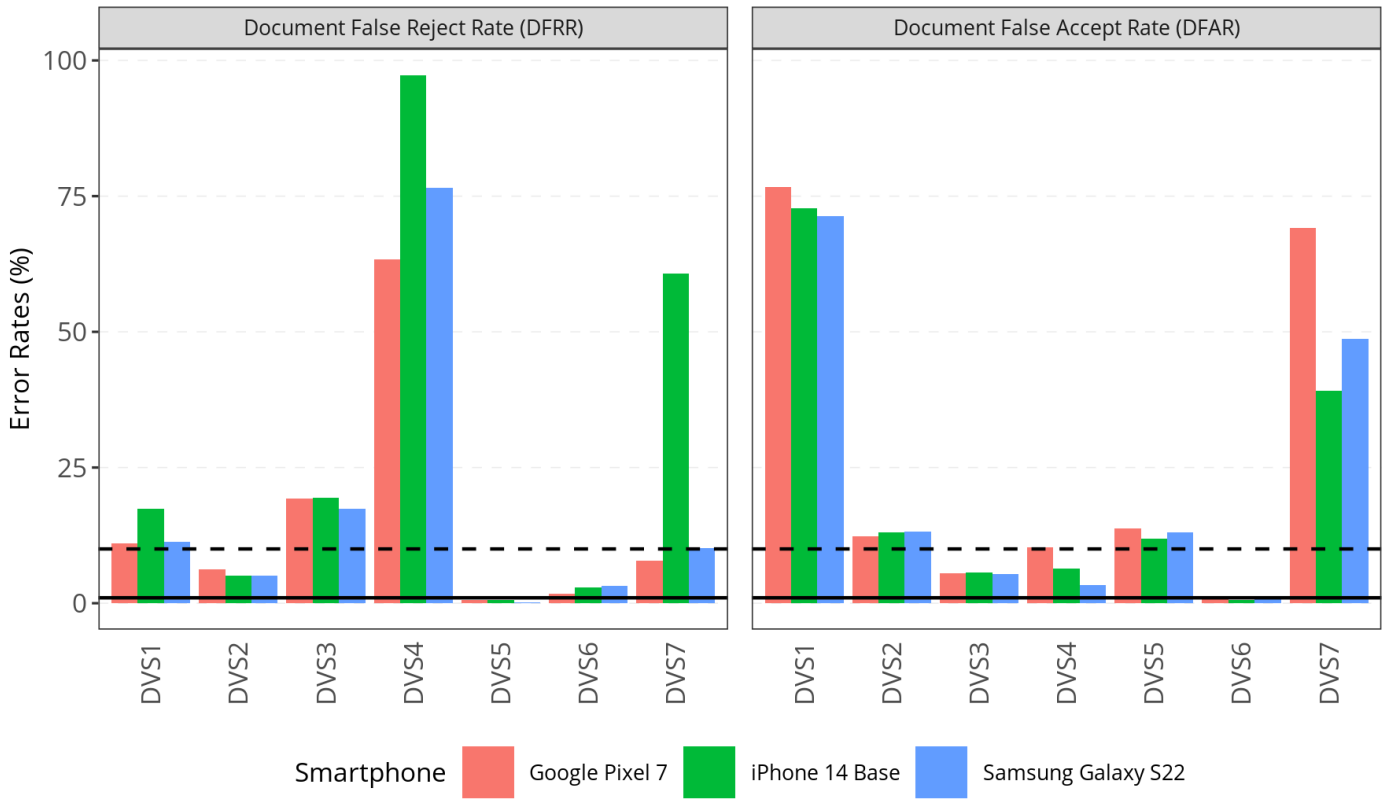
Document Validation Error Rates



Bars correspond to performance of combinations of smartphone and DVS. Area below the black line indicates 1% or lower SER. Area below the dashed black line indicates 10% or lower SER.

- **Discriminating genuine and fraudulent documents is difficult**
  - DVS 6 was the only subsystem that maintained both DFRR and DFAR below 10%
  - DVS 5 and DVS 3 came close
- **Some systems had very high error rates**
  - DVS 4 tended to reject all documents, while DVS 1 tended to accept all documents regardless of if they were fraudulent or genuine
- **Smartphone devices can affect performance**
  - DVS 7 rejected six times more genuine documents on the iPhone as compared to the Samsung or Pixel

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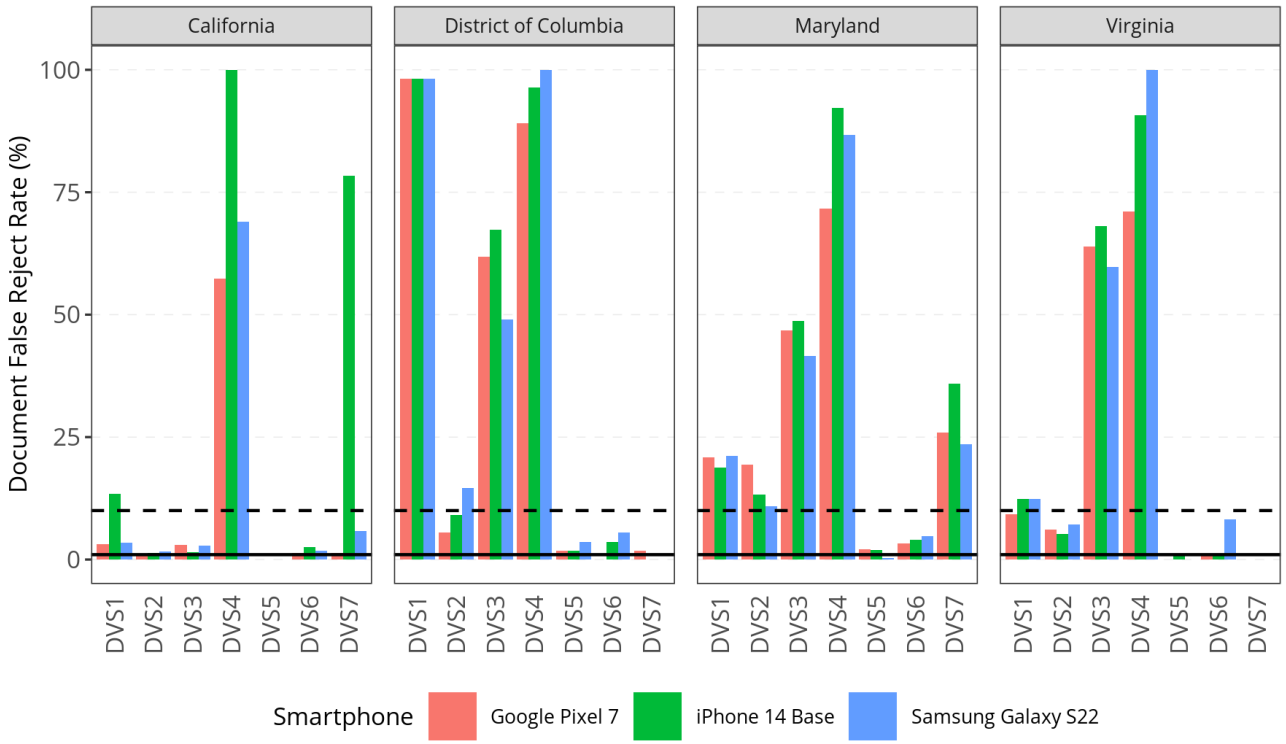
State of Issue: Document False Reject Rates



Bars correspond to performance of combinations of smartphone, states of issue, and DVS. Area below the black line indicates 1% or lower genuine SER. Area below the dashed black line indicates 10% or lower genuine SER.

- **Document state of issue affected DVS performance**
  - Overall Performance was worst for MD documents and best for CA documents

System combinations that met the threshold or goal		
Document State of Issue	DFRR < 10% (threshold)	DFRR < 1% (goal)
California	16	4
District of Columbia	11	3
Maryland	6	1
Virginia	13	5

- **Major impacts of state of issue**
  - DVS 3 met the DFRR threshold for CA but failed to do so for DC, MD, and VA

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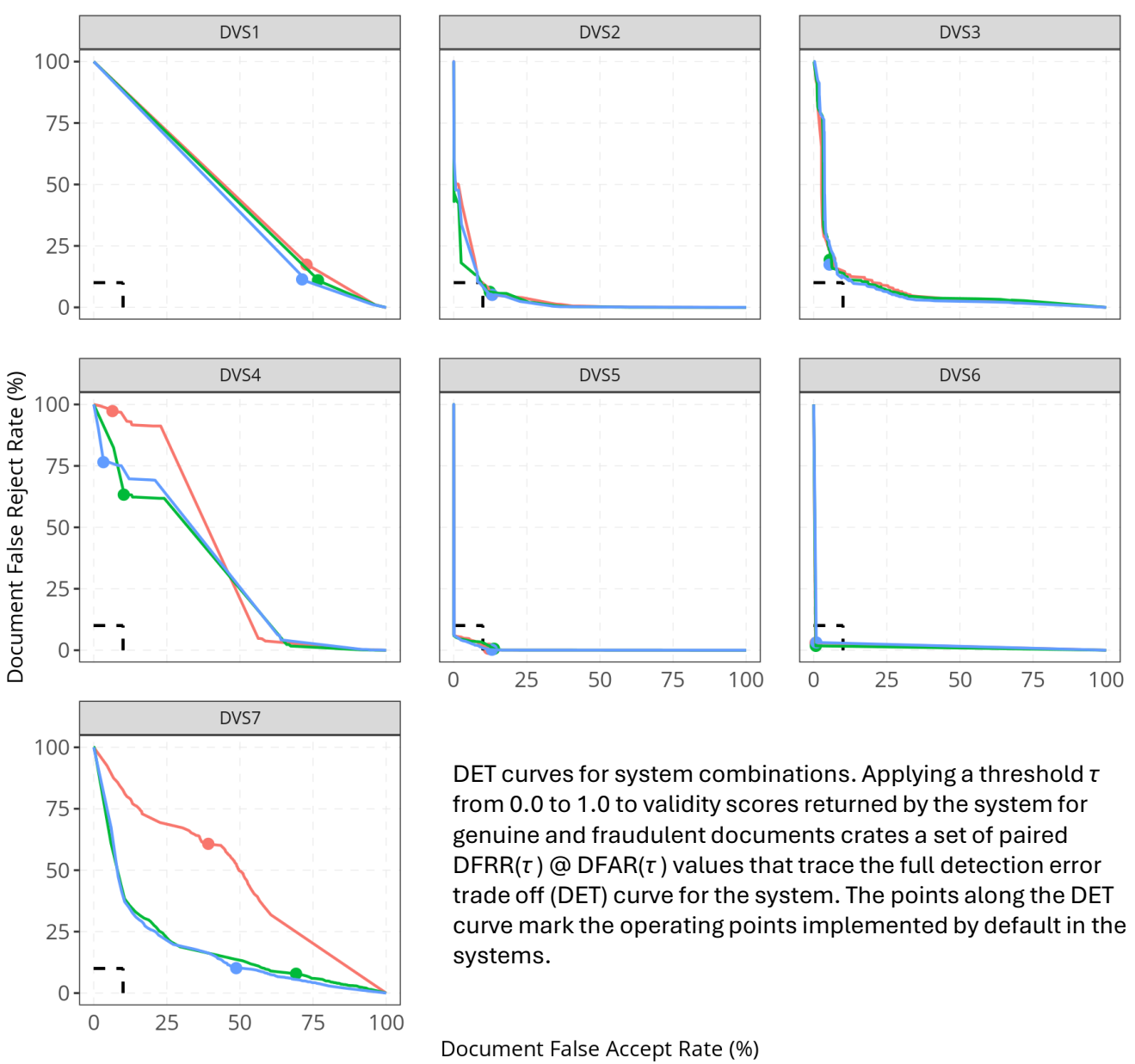
Detection Error Trade Off

- DVS 6 had the best ability to discriminate between genuine and fraudulent documents
- DVS 5 had comparable discriminative power - given an alternative threshold DVS 5 could have met RIVR IDV performance benchmarks



DET curves for system combinations. Applying a threshold τ from 0.0 to 1.0 to validity scores returned by the system for genuine and fraudulent documents crates a set of paired DFRR(τ) @ DFAR(τ) values that trace the full detection error trade off (DET) curve for the system. The points along the DET curve mark the operating points implemented by default in the systems.

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Summary & Conclusions

Results Summary

DVS	1	2	3	4	5	6	7
SER	1.76%	0.48%	13.9%	1.06%	0.03%	0.00%	0.00%
DFRR	17.4%	6.3%	19.4%	97.3%	0.59%	3.15%	60.7%
DFAR	76.7%	13.2%	5.68%	10.3%	13.8%	0.88%	69.2%

Legend	
X	Met Goal
X	Met Threshold
X	Did not meet Threshold

- No tested systems met RIVR goals for all metrics
- **DVS6** met RIVR performance thresholds for all metrics
- **6 of 7** tested systems were unable to meet the threshold for at least one metric
- **3 of 7** tested systems performed worse than a coin flip on at least one metric

Conclusions

- Discriminating between genuine and fraudulent documents based only on visible light images is an extremely challenging task
  - Industry error rates can be high – few DVS can meet 10% error rate benchmarks
  - For individual DVS, performance can vary by:
    - Imaging device
    - Document state of issue
- Although the task is challenging, some DVS can reliably discriminate between genuine and fraudulent documents included in this evaluation
- Maintaining both DFRR and DFAR below 10% continues to be a challenging benchmark for most technology providers

Questions & Answers

- Contact information
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