U.S. Customs and Border Protection

**FINAL REPORT**

**1:1 Face ePassport Air Entry Experiment
Washington Dulles International Airport – Main Terminal**

(b)(6);(b)(7)(C)

(b)(6);(b)(7)(C)

**Planning, Program Analysis and Evaluation**

Entry/Exit Transformation Office

**October 2015**

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# Executive Summary

The 1:1 Face ePassport Air Entry Experiment was initiated in 2014 ████████ (b) (7)(E) ████████ ████████████████████████████████████████ For the experiment, the biometric modality of facial comparison was tested in both controlled laboratory and operational field test environments. The operational field test took place at Washington Dulles International Airport (IAD) from March 2015 – May 2015. This report describes how U.S. Customs and Border Protection (CBP) Officers (CBPO) and travelers interacted with the facial comparison system, the impact of the technology on CBP operations in primary lanes and secondary inspection and the technology hardware/software the test results. **Figure 1** represents the types of technology tested in this experiment.
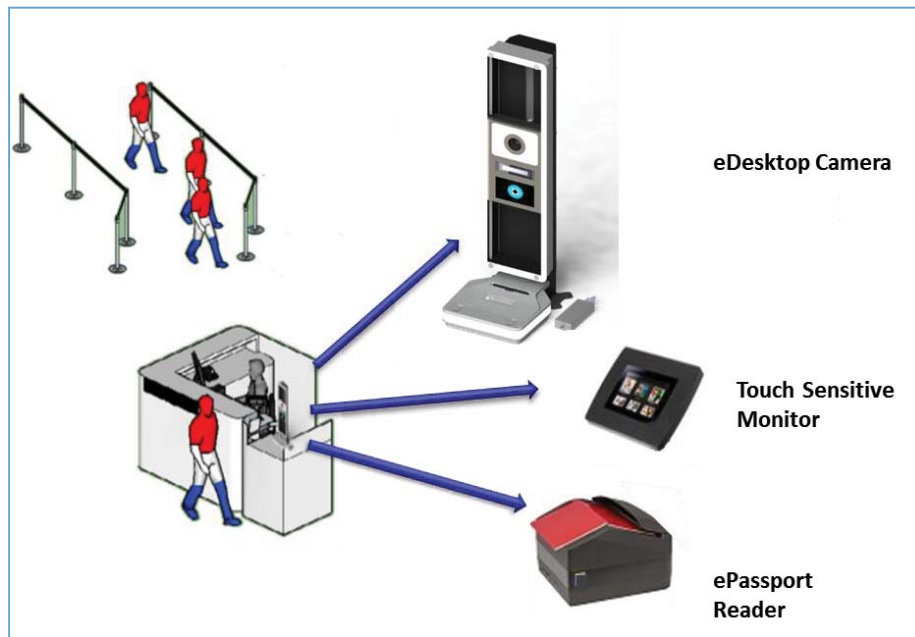


**Figure 1: 1:1 Face Experiment Booth Equipment**

During the operational field test at IAD, (b) (7)(E) traveler encounters[1] were recorded by facial comparison systems ████████████ (b) (7)(E) ████████████. **Table 1** provides a scoring breakdown of these encounters under the categories of High Match Confidence, Gray Area, and Low Match Confidence along with the scoring criteria for each category. Facial match scores were reported by the system on a scale of 0 – 100 with 0 the lowest Match Confidence Score and 100 the highest. Over 50% of travelers received a facial match score of 100.

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[1] The term "encounter" as used here should not be interpreted as a unique number of passengers that were part of the experiment. Double counting a unique individual could occur if the traveler's passport was scanned and an image taken and then repeated in an attempt to confirm a facial match score. A single encounter consisted of a successful passport scan coupled with a successful facial match score. ████████████████ (b) (7)(E) ████████████████████████████████████████████████████████████.

| | | | | (b) (7)(E) |
|---|---|---|---|---|
| **(b) (7)(E)** | | | | |
| **Total Travelers Processed** | | | | |

**Table 1: Facial Match Score Categories, Ranges, and Traveler Counts**

In-scope travelers for this experiment were citizens of the United States, ages 18 and over, in possession of a U.S. ePassport. An ePassport contains an RFID-readable chip that holds the photo image provided by the traveler when applying for the passport. The system compares the photo in the chip to a real-time photo taken of the individual presenting the document to provide a Facial Match Confidence Score. (b) (7)(E)

**(b) (7)(E)**

A number of significant findings were identified during the course of this experiment, which provide important feedback and input into CBP's possible expansion and introduction of facial comparison systems to other ports of entry. These findings include:

- **(b) (7)(E)**

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- CBPOs and the traveling public were generally able to use the system with little difficulty. The user interface for the CBPO was intuitive, simple and allowed for the efficient capture of traveler facial images.

- **(b) (7)(E)**

As a result of this experiment, CBP is moving forward with the installation of facial comparison **(b) (7)(E)** As expansion plans are evaluated, the following high-level recommendations are presented based upon the experiences and lessons learned from the IAD experiment:

- **(b) (5)** .

- **(b) (7)(E)**

  **(b) (5)**

- The Dulles experiment was limited in scope to U.S. citizens. **(b) (7)(E)**

  **(b) (5)**

- **(b) (5)**

  **(b) (7)(E)** .

In conclusion, the evaluation demonstrates that the experiment at Dulles was a success and further operational deployments are warranted. **(b) (5)**

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# 1 INTRODUCTION

This report is the culmination of the U.S. Customs and Border Protection (CBP) Entry/Exit Transformation Office's (EXT) 1:1 Face ePassport Air Entry Experiment (1:1 Face) at the Washington Dulles International Airport (IAD) Main Terminal. **(b) (7)(E)**

**(b) (7)(E)** EXT was tasked with preparing and executing a short-term experiment **(b) (7)(E)**

There is a possibility for imposters to enter the country using valid U.S. passports that have not been issued to them because:

1. **(b) (7)(E)**

2. 

## 1.1 BACKGROUND

The Department of Homeland Security (DHS) CBP EXT Office was established in May 2013 in response to the DHS Appropriations Act of 2013 (P.L 113-6).The primary mission of EXT is to enhance the integrity of the immigration system by providing assurance of traveler identity on departure, while subsequently matching that identity to arrival. To meet the mission, EXT has developed a strategy with three goals: Identify and Close Biographic Gaps, Conduct Targeted Biometric Operations, and Transform Entry/Exit Operational Processes. **Figure 1.1** depicts the Entry/Exit Transformation Strategy. The 1:1 Face experiment is a short-term biometric solution that is a part of the Targeted Biometric Operations.
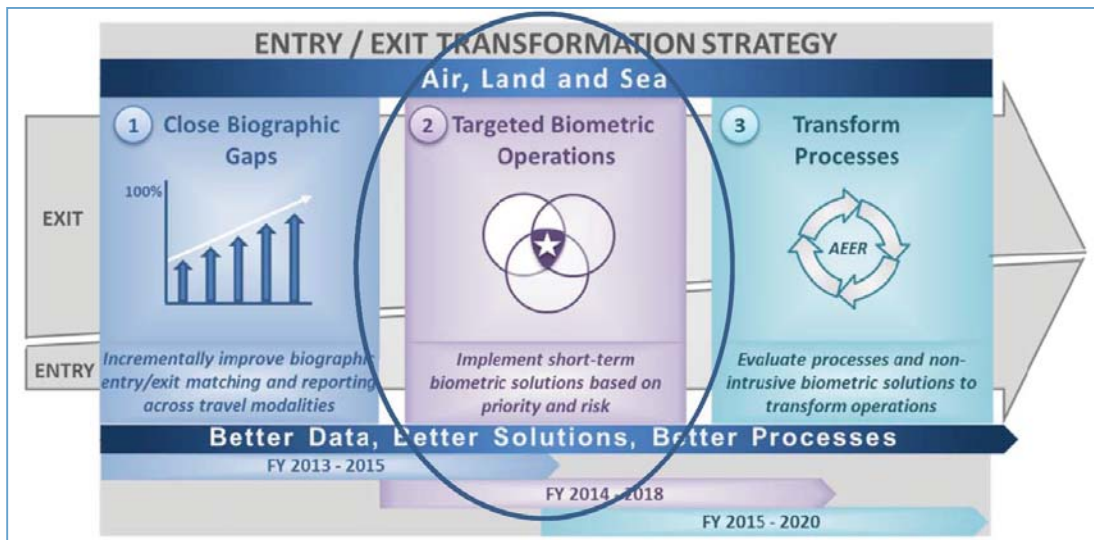


**Figure 1.1: Entry/Exit Transformation Strategy**

## 1.2 EXPERIMENT PURPOSE

EXT, in coordination with the CBP Office of Information and Technology (OIT), Passenger Systems Program Directorate (PSPD), created an experiment to determine **(b) (7)(E)**

The data collected through automated and observed means would serve as a performance baseline for future experiments, for system improvements, and help inform future CBP efforts to secure the passenger entry and exit process. **(b) (7)(E)**

## 1.3 EXPERIMENT OBJECTIVES

**(b) (7)(E)**

The technology must work on a 1:1 basis, comparing the USC ePassport image with that of the person standing before the CBPO. As such, the objectives of the experiment were:

1. Determine the viability of facial comparison technology to assist CBPOs in identifying possible imposters using U.S. ePassports to enter the United States.

2. Determine if facial comparison technology can be incorporated into current CBP entry processing with acceptable impacts to processing time and the traveling public while effectively providing CBPOs with a tool to counter imposters using valid U.S. travel documents.

3. Establish preliminary metrics for future phases of USC facial biometric inspection experiments.

## 1.4 EXPERIMENT SCOPE

1:1 Face integrated commercial off-the-shelf (COTS) products provided by multiple vendors. As depicted in **Figure 1.2**, **(b) (7)(E)**
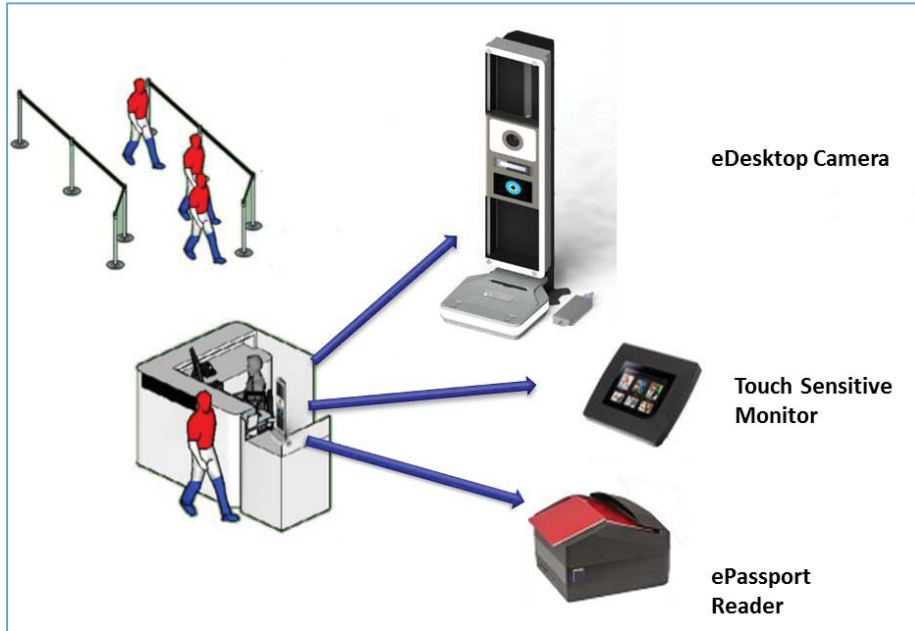
(b) (7)(E)

t.



**Figure 1.2: 1:1 Face Experiment Booth Equipment**

Four systems were installed at IAD from March 2015 through May 2015.     (b) (7)(E)

The majority of the subject traveler pool were USCs with ePassports     (b) (7)(E)

If unable to capture an image, the traveler was excluded from facial comparison.

The initial Go Live at IAD was on 12 March 2015. The system was active for 5 days, taken down on 16 March 2015 to absorb lessons learned and re-activated and run continuously from 15 April to 29 May 2015. All equipment was removed from IAD on 29 May 2015 and returned to the test lab for further analysis.

## 1.5 ASSUMPTIONS / CONSTRAINTS / CONCERNS

### 1.5.1 Assumptions

When 1:1 Face was conceived the data collection and reporting were based on the following assumptions:

- (b) (7)(E)
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### 1.5.2 Constraints

(b) (7)(E) :

- (b) (7)(E)
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-

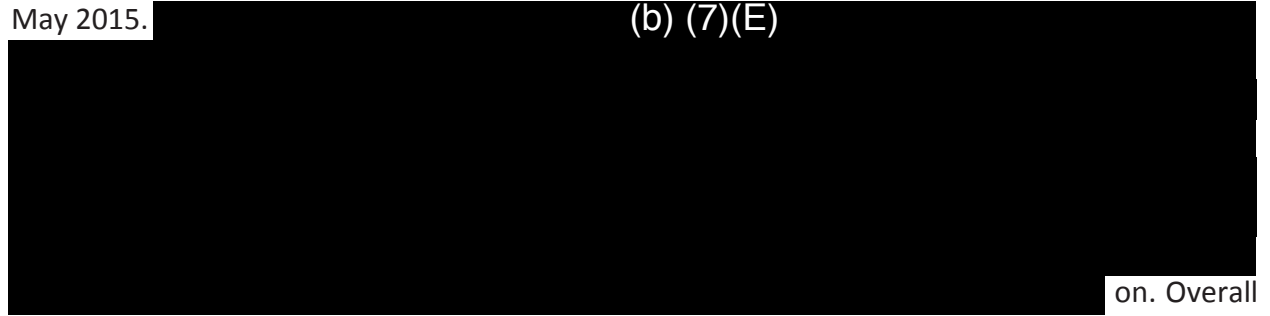- (b) (7)(E)
- 
- 
- 
- 

### 1.5.3   Concerns

- (b) (7)(E)
-

# 2 IMPLEMENTATION OF THE EXPERIMENT

## 2.1 DATA COLLECTION

### 2.1.1 Human Factors Data Collection

On-site data collection and CBPO feedback was obtained over the period from mid-April to mid-May 2015. (b) (7)(E) on. Overall time at the APC triage booth for the USC, including TPAC inspection was also collected. **Figure 2.1** displays the iPad data collection application used by the human factors observers.
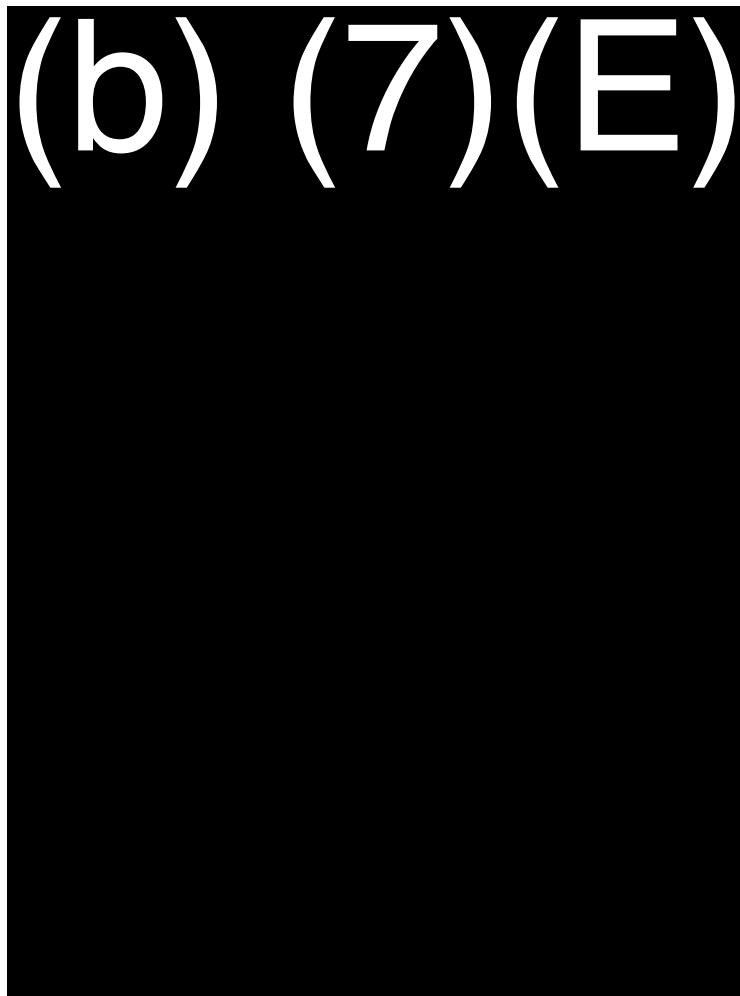
(b) (7)(E)

**Figure 2.1: iPad Human Factors Data Collection Screen**

Observed and human factors feedback was collected on the following:

- Number of USC encounters at each primary and secondary inspection booth. This was a subset of the total number collected by the facial comparison experiment equipment.

- Number of successful facial comparison inspections. A successful inspection was one in which the passport eChip was read, traveler passport image displayed and the USC's live image captured for comparison purposes.

- Total inspection time. Began when USC was called to the primary or secondary inspection booth. **(b) (7)(E)**

- Total facial comparison inspection time. **(b) (7)(E)**

- Live image collection and image comparison score display time. **(b) (7)(E)**

- **(b) (7)(E)**

- 

- Ability of USC to understand CBPO directions and signs describing how to stand in front of the 1:1 Face live image camera.

- **(b) (7)(E)** .

- Number of live image re-takes by CBPO for the 1:1 Face inspection.

- **(b) (7)(E)** .

- **(b) (7)(E)**

Facial comparison experiment inspection operations for a USC referred to secondary were the same as a primary inspection, **(b) (7)(E)**

This was CBP's first use of technology for live facial comparison inspections on USCs in an operational environment. **(b) (7)(E)**
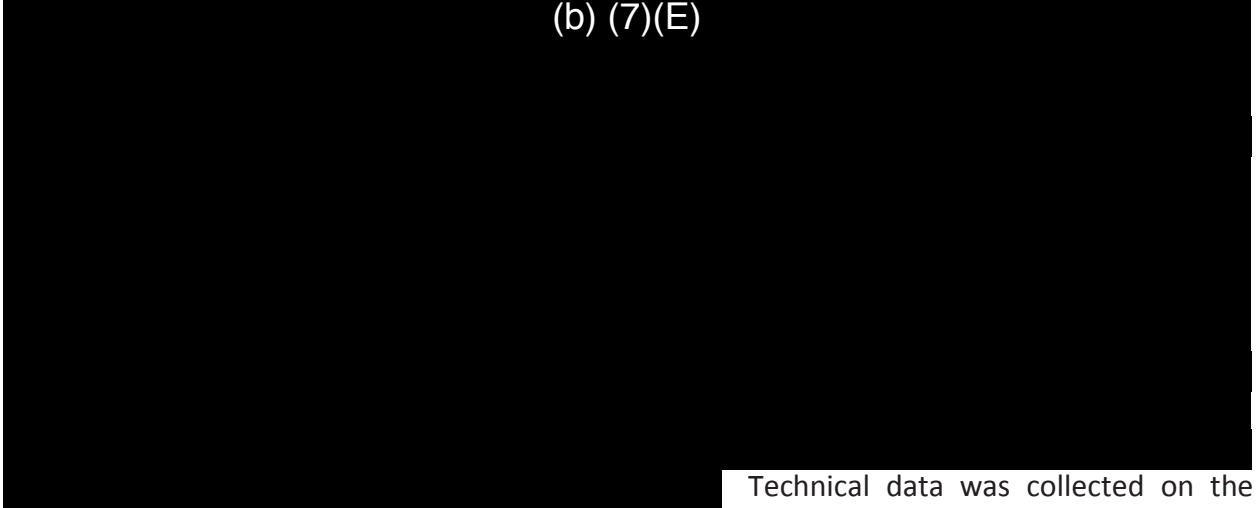
**(b) (7)(E)** .
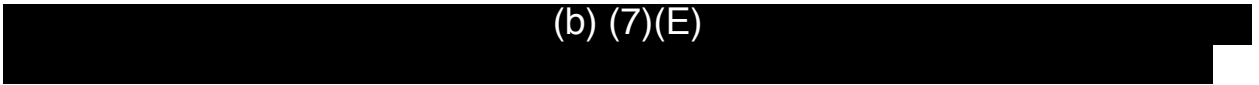
### 2.1.2 Technical Data Collection

(b) (7)(E)

Technical data was collected on the following:

- Image statistics
- Matching Accuracy Results
- Image Quality Impacts to Accuracy
- Identifying Relevant Quality Metrics
- Shadows and Unnatural Color
- Eye Validity Impacts to Accuracy
- Estimated Age Impacts to Accuracy
- ePassport Image Age Impacts to Accuracy
- Image Tokenization
- Reference vs. Probe Image Reversal
- Additional Image Characteristics Impacts to Accuracy
- Data Anomalies

(b) (7)(E)

# 3 THE EXPERIMENT

## 3.1 TYPICAL SCENARIO DESCRIPTION

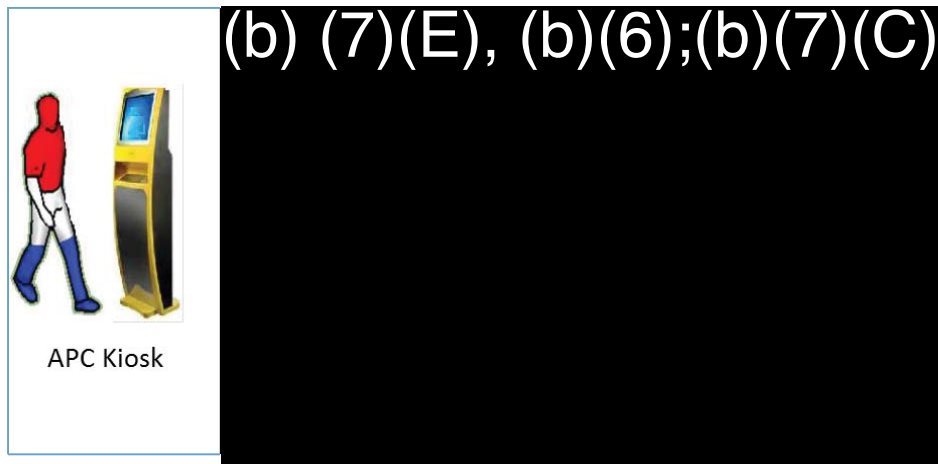**Figure 3.1** ███████████████████████ (b) (7)(E) ████████████████

███████████████████████████████████████████████████



(b) (7)(E), (b)(6);(b)(7)(C)

APC Kiosk

**Figure 3.1: Primary APC Triage Booth Flow**

████████████████████████ (b) (7)(E) ███████████████████████

████████████████ In the primary area, equipment for the facial comparison experiment system was located in ███ (b) (7)(E) ███ inspection booths used████████████ (b) (7)(E) ████████████████████████████████████ passport to the CBPO, who would then swipe the passport ██████████████████ (b) (7)(E) ████████████████████ A standard configuration for the CBP desktop, MRZ reader, ePassport reader, and touch screen monitor as used at Dulles is shown in **Figure 3.2**.



**Figure 3.2: 1:1 Face Biometric Feedback Monitor and eChip Reader on the left**

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After scanning the passport into the (b) (7)(E) system, the CBPO scanned the passport into the 1:1 Face comparison system (b) (7)(E) and displayed the passport photo page as displayed in **Figure 3.3.** The traveler was directed to stand in front of the 1:1 Face comparison camera where a live image was captured. **Figure 3.4** shows the traveler's perspective of the CBP APC triage booth and facial comparison system as deployed at Dulles. This image, along with the embedded passport image, was displayed on the biometric feedback monitor with a comparison score for the two images. A sample screen display is shown in **Figure 3.5.**
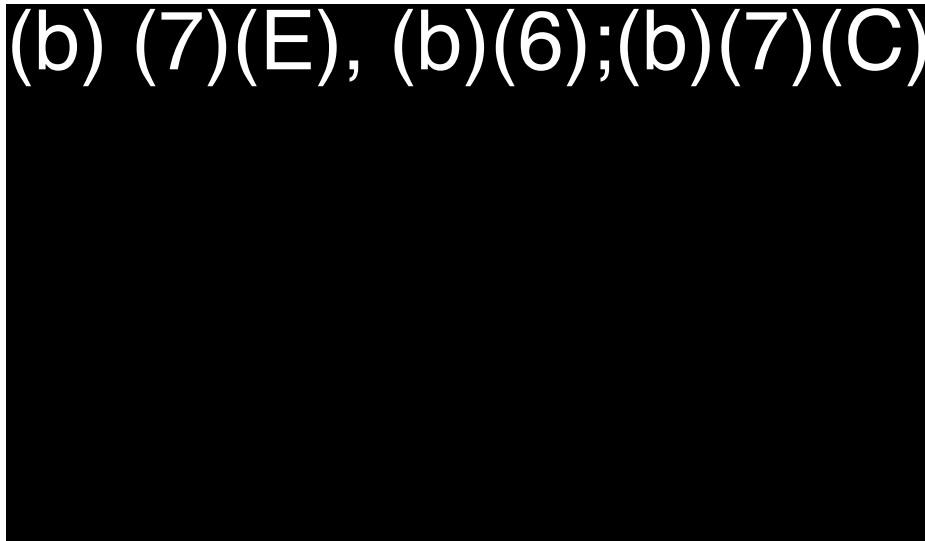
(b) (7)(E), (b)(6);(b)(7)(C)

**Figure 3.3: View of successful eChip Image Read on Biometric Feedback Monitor**



**Figure 3.4: Traveler view of Live Image Camera system, on the right**
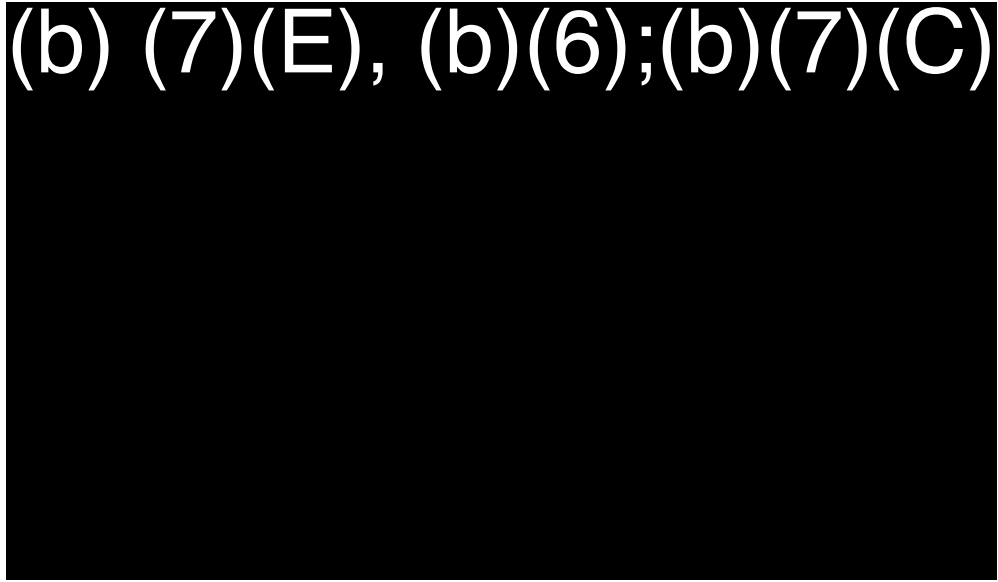
(b) (7)(E), (b)(6);(b)(7)(C)

**Figure 3.5: View of Live Image and eChip Comparison score on Biometric Feedback Monitor**

The facial comparison system reported match confidence scores on a 0 – 100 scale. (b) (7)(E)

(b) (7)(E)

Table (b) (7)(E)

(b) (7)(E)

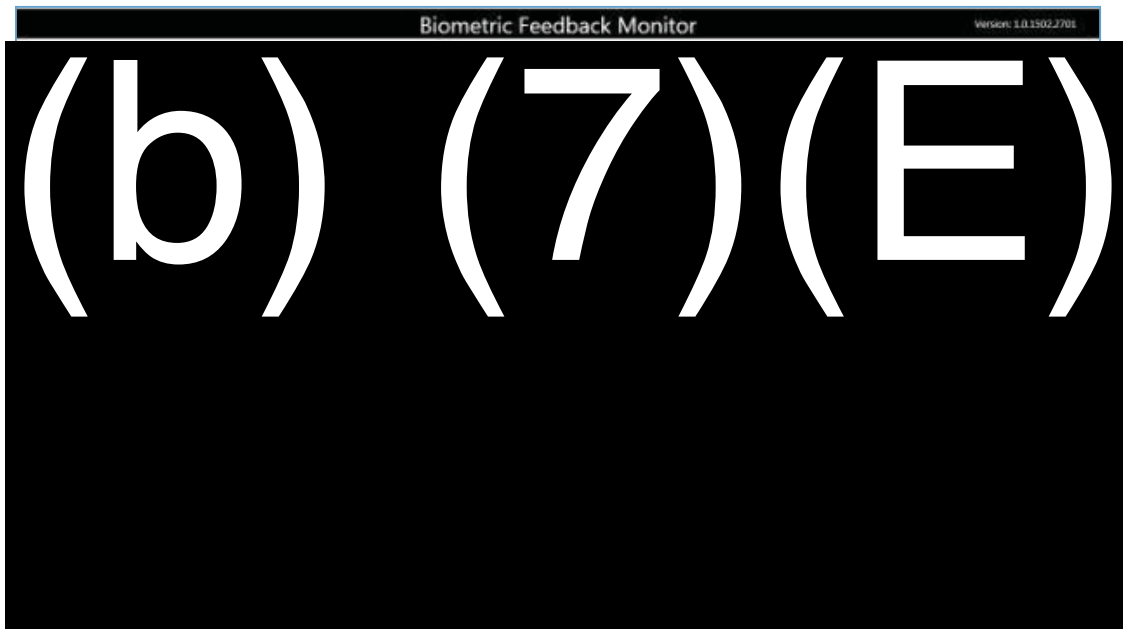If the eChip was not read successfully, (b) (7)(E)
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(b) (7)(E)

Figure 3.6: View of unsuccessful eChip Image Read on Biometric Feedback Monitor

## 3.2 OBSERVATIONS

IAD made extensive use of recently installed APC kiosks for USC travelers. (b) (7)(E) These USCs were mixed with the entry lines for the general population of lawful permanent residents, Visa Waiver Program (VWP) travelers, and other foreign visitors arriving at the airport.

(b) (7)(E)

**Figure 3.7** percentages are based on (b) (7)(E) encounters over the length of the experiment. This number includes secondary inspections but not multiple image takes for each encounter. **Figure 3.8** percentages are based on (b) (7)(E) on-site observed encounters over five selected days. These are a small subset of the encounters recorded over the 45 day experiment period. The observed category percentages are within the expected range for the larger pool of data.
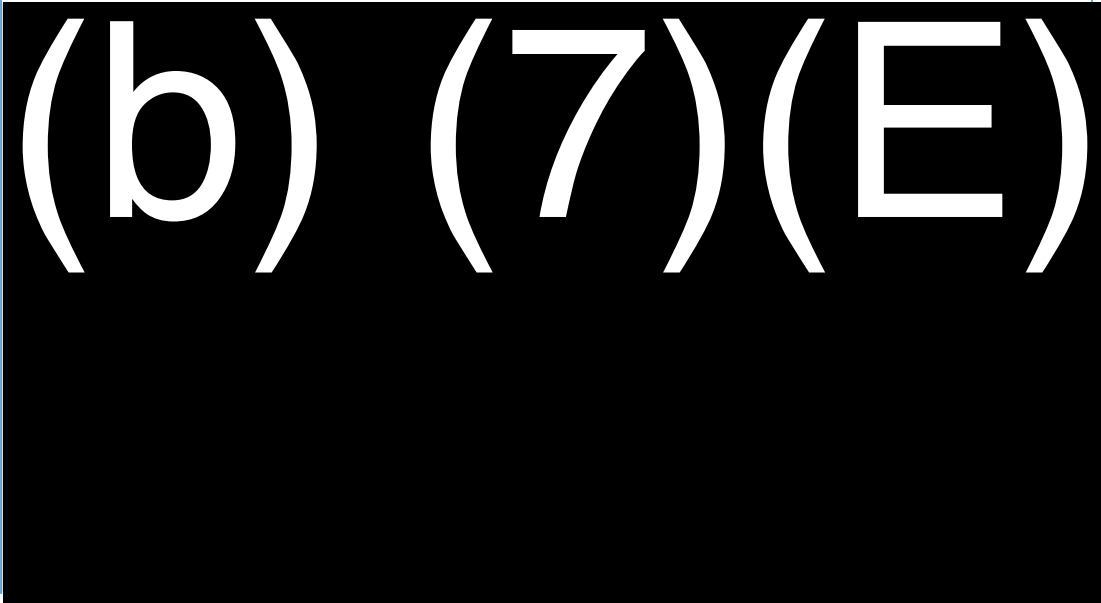
## Percentage of Facial Comparison Matches by Category

(b) (7)(E)

**Figure 3.7: Distribution of System Collected Facial Comparison Scores by Release Category**

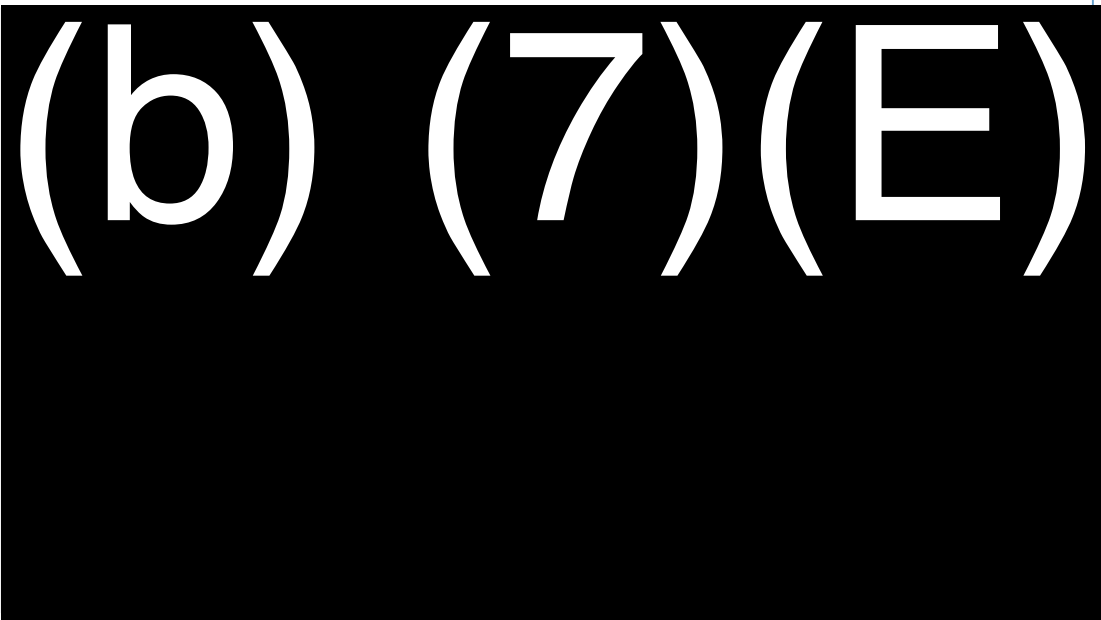## Percentage of Facial Comparison Matches by Category (Observed)

(b) (7)(E)

**Figure 3.8: Distribution of Observation Collected Facial Comparison Scores by Release Category**

Prior to the facial comparison experiment ████████ (b) (7)(E) ████████

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████████████████ (b) (7)(E) ████████████████
. As the experiment progressed at Dulles, ████ (b) (7)(E) ████
████████████████████████████████████████████
████████████████████

**3.3** ████████ (b) (7)(E) ████████

# (b) (7)(E)

(b) (7)(E)

Figure 3.9:              (b) (7)(E)

(b) (7)(E)

(b) (7)(E)

**Figure 3.10:** (b) (7)(E) )

(b) (7)(E)
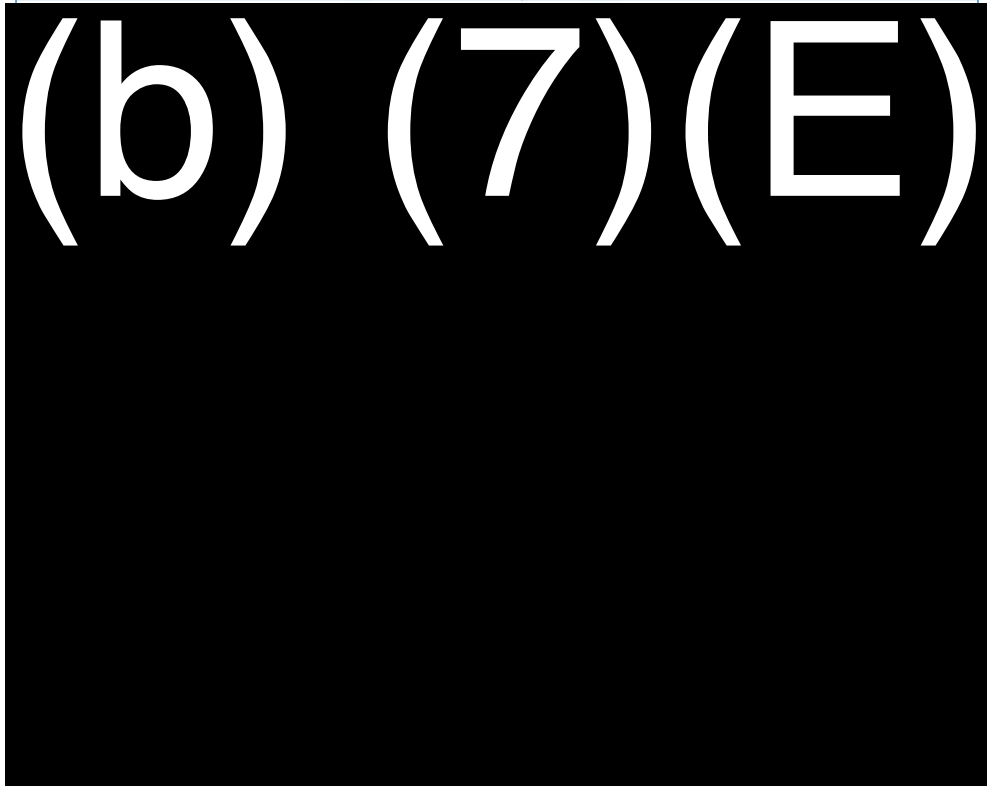
## 3.4 CBP OFFICER FEEDBACK

CBPOs who used the facial comparison experiment equipment at Dulles were asked to provide feedback on facial comparison experiment system operations. 43 CBPOs provided comments. **Table 3.2** provides a synopsis of CBPO feedback.

| Feedback Topics | Response Synopses |
|---|---|
| 1:1 Face System Integration | (b) (7)(E) |
| Initial Passport Reader | |
| Processing Time | |
| 1:1 Face Utility | |
| 1:1 Face Camera Operations | |
| 1:1 Face Biometric Feedback Monitor/Comparison Software Operations | |
| 1:1 Face System USC Processing | |
| General Observations | |

**Table 3.2: IAD CBPO Comments**

## 4   FINDINGS

(b) (7)(E)

### 4.1   OVERALL FINDINGS

(b) (7)(E)

### 4.2   OPERATIONAL FINDINGS

- (b) (7)(E)

- (b) (7)(E)
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## 4.3  TECHNICAL FINDINGS

- (b) (7)(E)
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(b) (7)(E)

## 5  RECOMMENDATIONS AND RESULTING CHANGES

As a result of the overwhelming success of this experiment and based on live observations during the facial comparison experiment a number of recommendations and changes to support the transition from an experiment to an operational system are suggested:

- (b) (5), (b) (7)(E)

- (b) (5), (b) (7)(E)

| FACIAL MATCH SCORE CATEGORY | SCORE RANGE |
|---|---|
| (b) (7)(E) | |

**Table 5.1: Facial Match Score Criteria to be used at JFK**
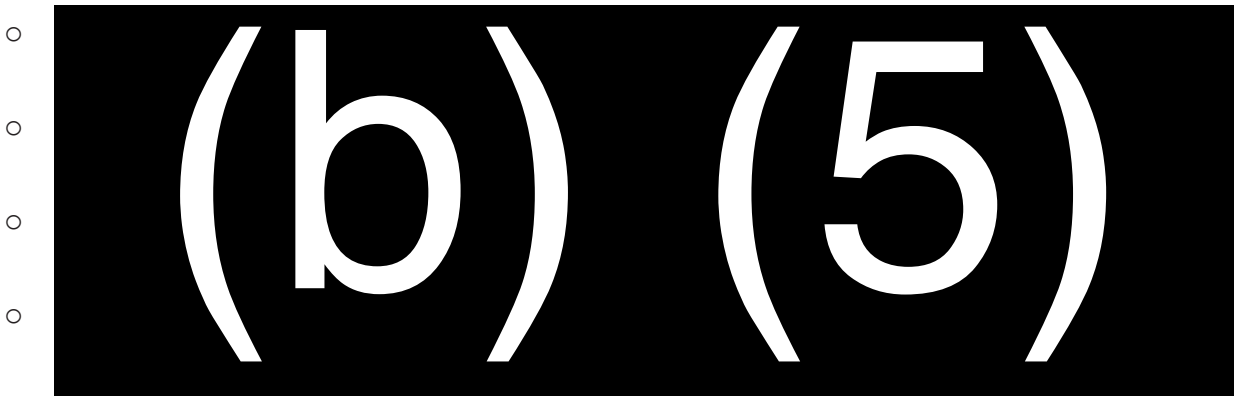
- (b) (5)

- (b) (7)(E)

  . To support the CBPO, (b) (5)

## 6  PROPOSED NEXT STEPS

**LONG TERM GOAL** - **Biometric verification of every person seeking entry into the United States.**
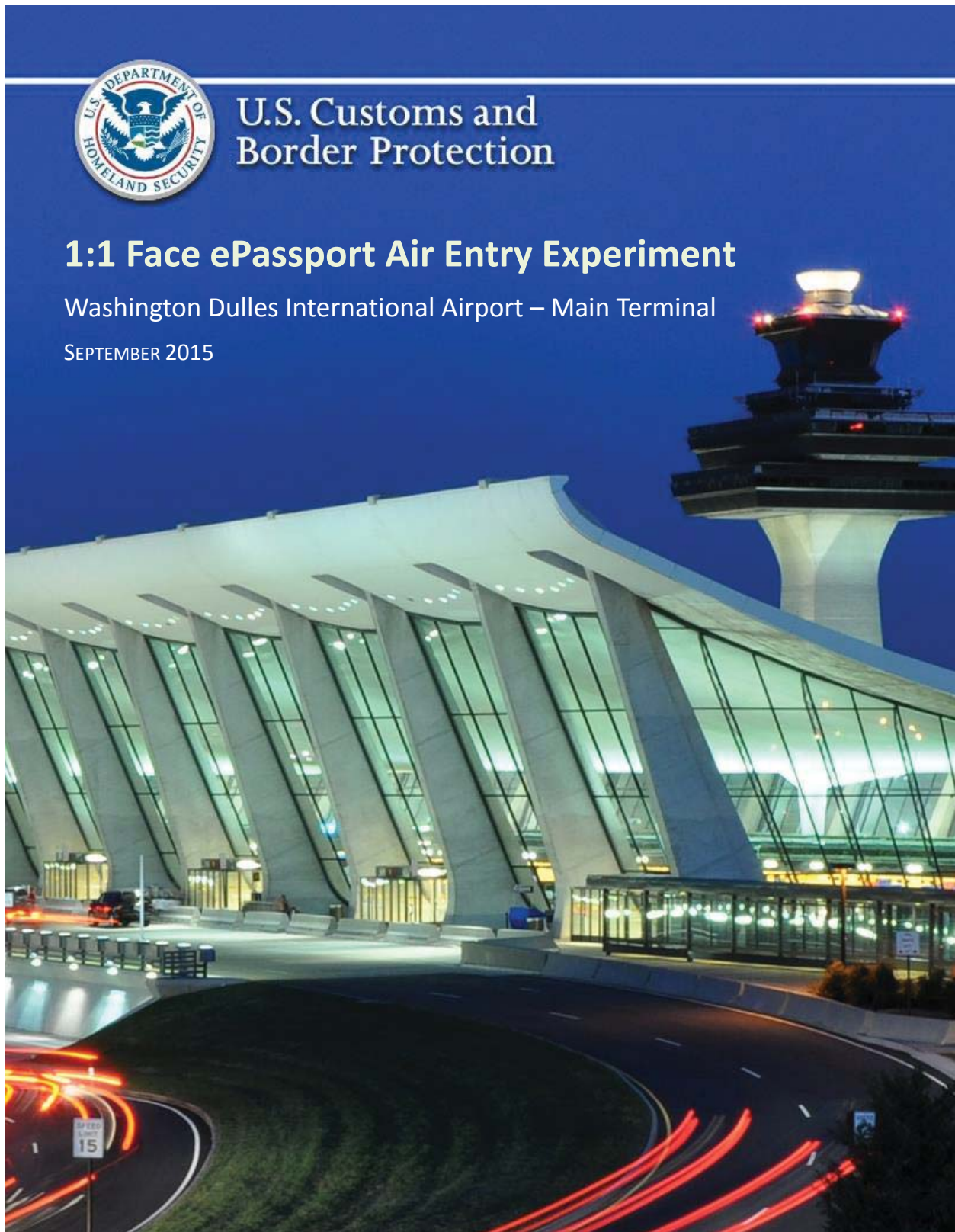
- Near Term:
  - (b) (5)
  - 
  - 

- Mid-Term:
  - (b) (5)
  - 
  - 
  - 

- Lon
  - (b) (5)
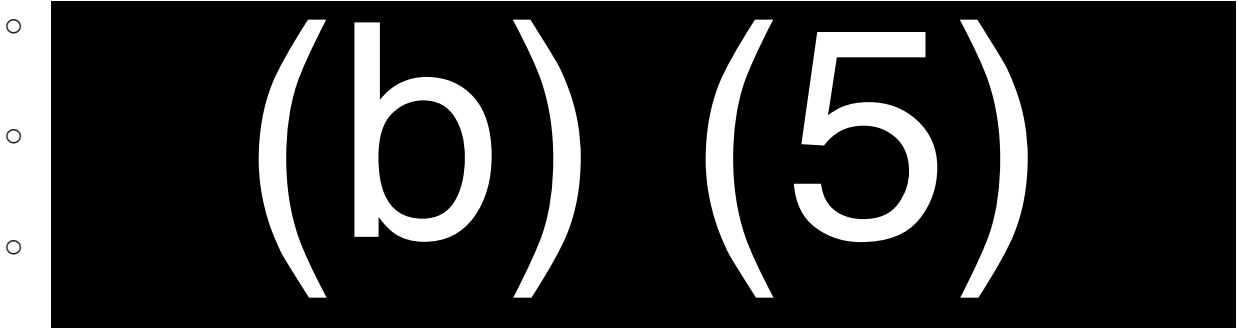
# 7 APPENDICES

## 7.1 ACRONYMS

| | |
|---|---|
| APC | Automated Passport Control |
| CBP | U.S. Customs and Border Protection |
| CBPO | CBP Officer |
| COTS | Commercial Off-The-Shelf |
| CSF | Critical Success Factor |
| CSIS | Consolidated Secondary Inspection System |
| DHS | Department of Homeland Security |
| ESTA | Electronic System for Travel Authorization |
| EXT | Entry/Exit Transformation Office |

(b) (7)(E)

| | |
|---|---|
| IAD | Washington Dulles International Airport |
| IDENT | Automated Biographic Information System |
| JFK | John F. Kennedy International Airport |
| KPI | Key Performance Indicator |
| NIST | National Institute of Standards |
| MBE | Multiple-Biometric Evaluation |
| MRZ | Machine Readable Zone |

(b) (7)(E)

| | |
|---|---|
| OFO | Office of Field Operations |
| OI | Office of Intelligence |
| OIT | Office of Information and Technology |
| PIA | Privacy Impact Assessment |
| POE | Port of Entry |
| PPAE | Planning, Program Analysis and Evaluation |
| PSPD | Passenger Systems Program Division |
| SOP | Standard Operating Procedures |
| TPAC | Traveler Primary Arrival Client |
| USC | United States Citizen |
| VWP | Visa Waiver Program |

# 1:1 Face ePassport Air Entry Experiment

Washington Dulles International Airport – Main Terminal

SEPTEMBER 2015

(b) (7)(E)

- (b) (7)(E)

| Ref Para | Metric | How Measured | CSF / KPI | Data Collected and Reported |
|---|---|---|---|---|
| 7.2.1 | Number of USCs processed at facial comparison experiment APC Triage booths<br><br>Number of USC processed at facial comparison experiment secondary booth | (b) (7)(E) | | |
| 7.2.2 | Average traveler primary inspection cycle time – Pre facial comparison experiment | | | |
| 7.2.3 | Average traveler primary inspection cycle time – facial comparison experiment | | | |
| 7.2.4 | Average USC primary inspection time–Pre facial comparison experiment | | | |

| Ref Para | Metric | How Measured | CSF / KPI | Data Collected and Reported |
|---|---|---|---|---|
| 7.2.5 | Average USC primary inspection time with facial comparison experiment | (b) (7)(E) | | |
| 7.2.6 | (b) (7)(E) | | | |
| 7.2.7 | Average eChip read time | | | |
| 7.2.8 | (b) (7)(E) | | | |
| 7.2.9 | | | | |
| 7.2.10 | | | | |
| 7.2.11 | | | | |

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| Ref Para | Metric | How Measured | CSF / KPI | Data Collected and Reported |
|---|---|---|---|---|
| 7.2.12 | Average live image capture time | (b) (7)(E) | | |
| 7.2.13 | Average total facial comparison experiment inspection time | | | |
| 7.2.14 | Traveler understanding of facial comparison experiment directions at experiment booths | | | |
| 7.2.15 | (b) (7)(E) | | | |
| 7.2.16 | | | | |
| 7.2.17 | | | | |
| 7.2.18 | | | | |

**Table 7.1: Facial Comparison Experiment Primary Inspection Performance Metrics**

### 7.2.1 Number of USCs Processed

(b) (7)(E)

### 7.2.2 Average Traveler Primary Inspection Cycle Time – Pre-Facial Comparison Experiment

(b) (7)(E)

### 7.2.3 Average Traveler Primary Inspection Cycle Time – Facial Comparison Experiment

(b) (7)(E)

### 7.2.4 Average USC Primary Inspection Time – Pre-Facial Comparison Experiment

(b) (7)(E)

### 7.2.5 Average USC Primary Inspection Time with Facial Comparison Experiment

(b) (7)(E)

(b) (7)(E)

**7.2.6** (b) (7)(E)

(b) (7)(E)

**7.2.7  Average eChip Read Time**

(b) (7)(E)

**7.2.8** (b) (7)(E)

(b) (7)(E)

| | USC Encounter | Successful Encounter | Success % |
|---|---|---|---|
| (b) (7)(E) | | | |

**Table 7.2:** (b) (7)(E)

(b) (7)(E)

(b) (7)(E)

**7.2.9** (b) (7)(E)

(b) (7)(E)

**7.2.10** (b) (7)(E)

(b) (7)(E)

(b) (7)(E)

**7.2.11** (b) (7)(E)

(b) (7)(E)

(b) (7)(E)

**Figure 7.2:** (b) (7)(E)

### 7.2.12 Average Facial Comparison Experiment Live Image Capture Time Times

(b) (7)(E)

| (b) (7)(E) | |
|---|---|
| **Elapsed Camera Imaging Time (sec)** | |
| **Average** | **Median** |
| (b) (7)(E) | |

**Table 7.3:** (b) (7)(E)

### 7.2.13 Average Complete Facial Comparison Experiment Inspection Times

(b) (7)(E)

| (b) (7)(E) | |
|:---:|:---:|
| **Complete Facial Comparison Inspection Time (sec)** | |
| **Average** | **Median** |
| (b) (7)(E) | |

**Table 7.4: Complete Facial Comparison Inspection Average and Mean Elapsed Times**

(b) (7)(E)

(**Figure 7.3)**.

(b) (7)(E)

**Figure 7.3:** (b) (7)(E)

(b) (7)(E)

(b) (7)(E)

### 7.2.14 USC Understood Posted Signs and CBPO Directions for Live Image Capture

USCs observed undergoing the facial comparison experiment comparison matching had no issues with understanding CBPO directions in where to stand for the live image capture. They readily complied with recommended head positions and facial expressions if a live image re-take was deemed necessary.

**(b) (7)(E)**

. A poster was placed with each facial comparison experiment live image camera (**Figure 7.4**) to guide the USC with correct head and eye placement in front of the camera. In most cases, travelers followed the CBPO's directions rather than refer to the poster.
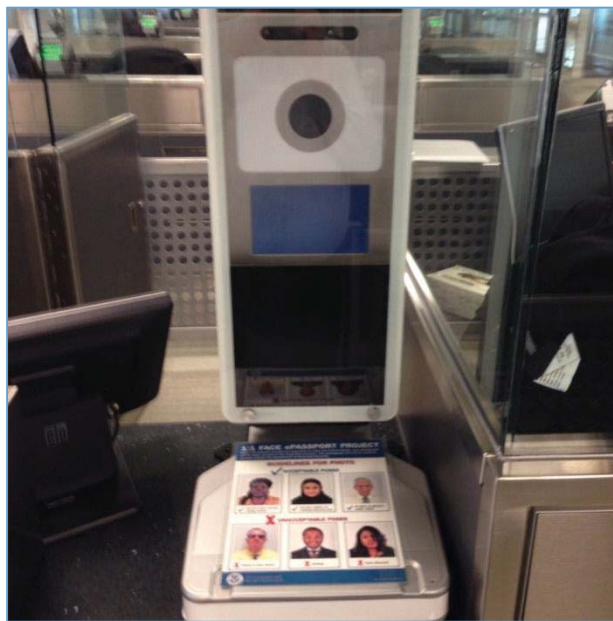


**Figure 7.4: Posing Prompt Poster for Live Image at Base of Facial Comparison Experiment Live Image Camera**

**(b) (7)(E)**

### 7.2.15 **(b) (7)(E)**

**(b) (7)(E)**

**(b) (7)(E)**

(b) (7)(E)

(b) (7)(E)

**Figure 7.5:** (b) (7)(E)

(b) (7)(E)

**7.2.16** (b) (7)(E)

(b) (7)(E)

### 7.2.17  Number of Live Images Taken at the Primary and Secondary Inspection Booths

The facial comparison experiment SOP called for a maximum of three live image re-takes for each USC encounter. For all successful facial comparison experiment inspection encounters (b) (7)(E)

**(b) (7)(E)**   .

**7.2.18**   (b) (7)(E)

(b) (7)(E)

In addition to timing and score data the on-site observers collected data on non-numerical system performance. This data is summarized in **Table 7.5** and described in the following paragraphs.

| Ref Para | Metric | How Measured | CSF / KPI | Data Collected and Reported |
|---|---|---|---|---|
| 7.2.19 | (b) (7)(E) | | | |
| 7.2.20 | Maintainability - was there maintenance that is required or done at the CBPO/FTO level? | (b) (7)(E) | | No maintenance or availability data was collected. (b) (7)(E) |
| 7.2.21 | Ease of facial comparison experiment equipment instruction comprehension by USC travelers | (b) (7)(E) | | |
| 7.2.22 | Public Communications | | | |
| 7.2.23 | (b) (7)(E) | | | |
| 7.2.24 | Training | (b) (7)(E) | | CBPO comments on training were positive. |

| Ref Para | Metric | How Measured | CSF / KPI | Data Collected and Reported |
|---|---|---|---|---|
| 7.2.25 | (b) (7)(E) | | | |

**Table 7.5: Facial Comparison Experiment Port-Wide Performance Metrics**
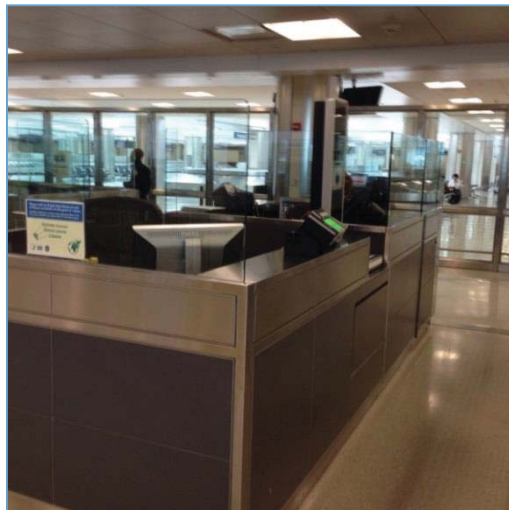
**7.2.19** (b) (7)(E)

(b) (7)(E)

**Figure 7.6: Facial Comparison Experiment System Equipped Primary Inspection Booth**

(b) (7)(E)

**Figure 7.7: APC Kiosks in the International Arrival Area**

(b) (7)(E)

(b) (7)(E)

### 7.2.20 Maintainability and Operability of Facial Comparison Experiment Equipment in the Field

(b) (7)(E)

d. In instances where equipment was inoperable, CBPOs processed travelers through the normal primary inspection process until the system was brought back into operation.

### 7.2.21 Ease of Facial Comparison Experiment Equipment Comprehension by USCs

No observed USCs had difficulty with following CBPO directions for standing and posing (b) (7)(E)

### 7.2.22  Public Communications

The EXT Project Office placed a pose guidance placard at the bottom of each facial comparison experiment live image camera. There were information pamphlets available for USCs to read and take that were placed next to the live image camera.

### 7.2.23  (b) (7)(E)

(b) (7)(E)

### 7.2.24  Training

The project team provided a series of demonstrations and training sessions prior to the facial comparison experiment system deployment at IAD. There was an equipment demonstration for CBPO trainers and delivery of the system SOP to the port at the end of February 2015. CBP Dulles Training Officers attended a train-the-trainer session at the (b) (7)(E) where PowerPoint training materials were provided to the Training Officers. Classroom training was held at Dulles on 10 - 11 March. (b) (7)(E) The Port conducted on-the-job-training for CBPOs from 12 – 16 March, covering two shifts per day. Training was given to both primary and secondary CBPOs. Quick reference cards were located at the booths with facial comparison experiment equipment installed. (b) (7)(E) hs.

### 7.2.25  (b) (7)(E)

(b) (7)(E)

## 7.3 TECHNICAL EVALUATION

# U.S. Customs and Border Protection (CBP)
# Land Border Integration (LBI) Program

# Facial Recognition Experiment Data Analysis Report

**Prepared by:**

(b)(6);(b)(7)(C)

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Telephone: (b)(6);(b)(7)(C)

**Provided to:**

Unisys Federal Systems Under Contract JBT-00139

August 14, 2015

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## I. EXECUTIVE SUMMARY

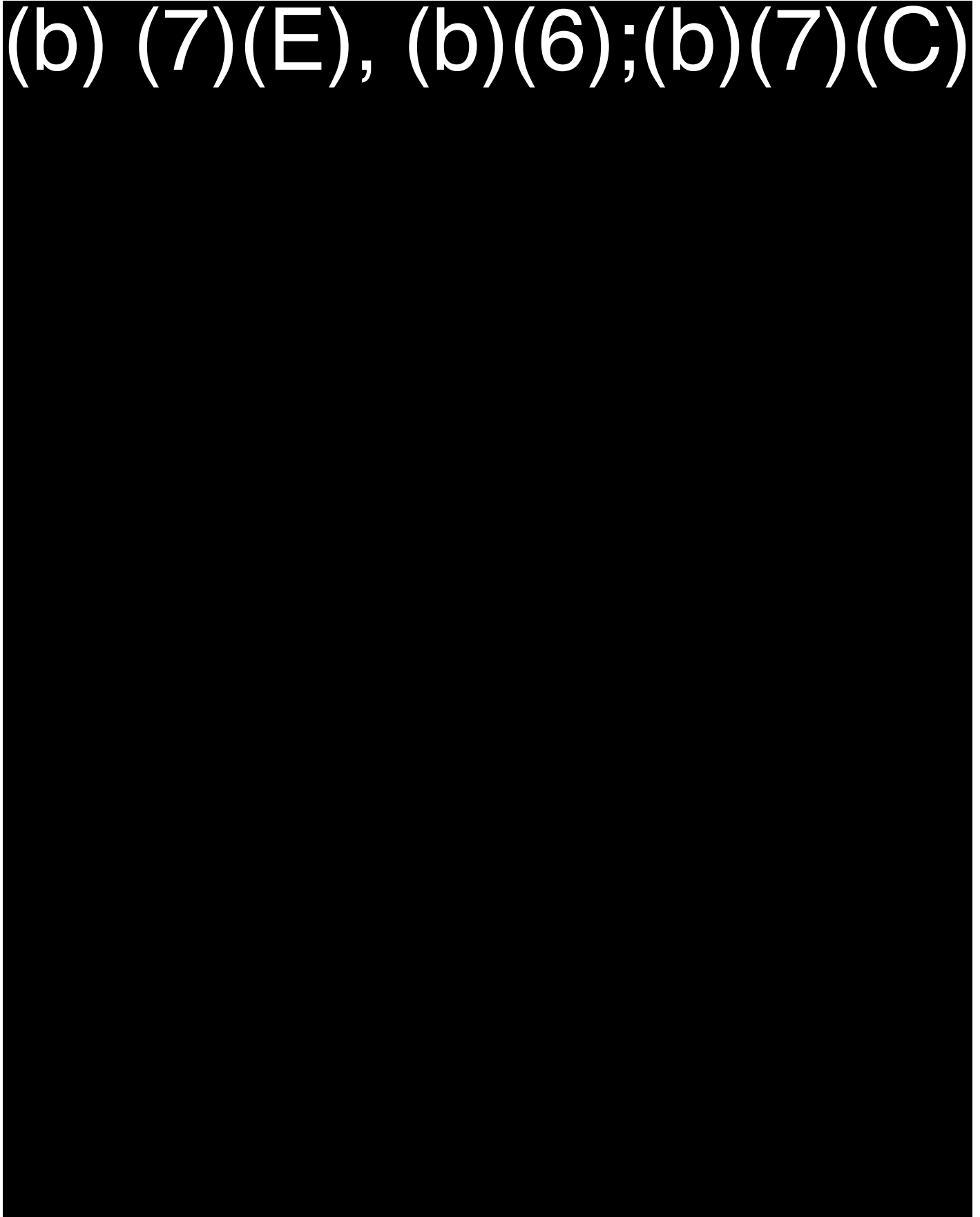(b) (4), (b) (7)(E)

(b) (4), (b) (7)(E)

(b) (7)(E)

## II.    REPORT DESCRIPTION

### II.A    FACIAL RECOGNITION EXPERIMENT OVERVIEW
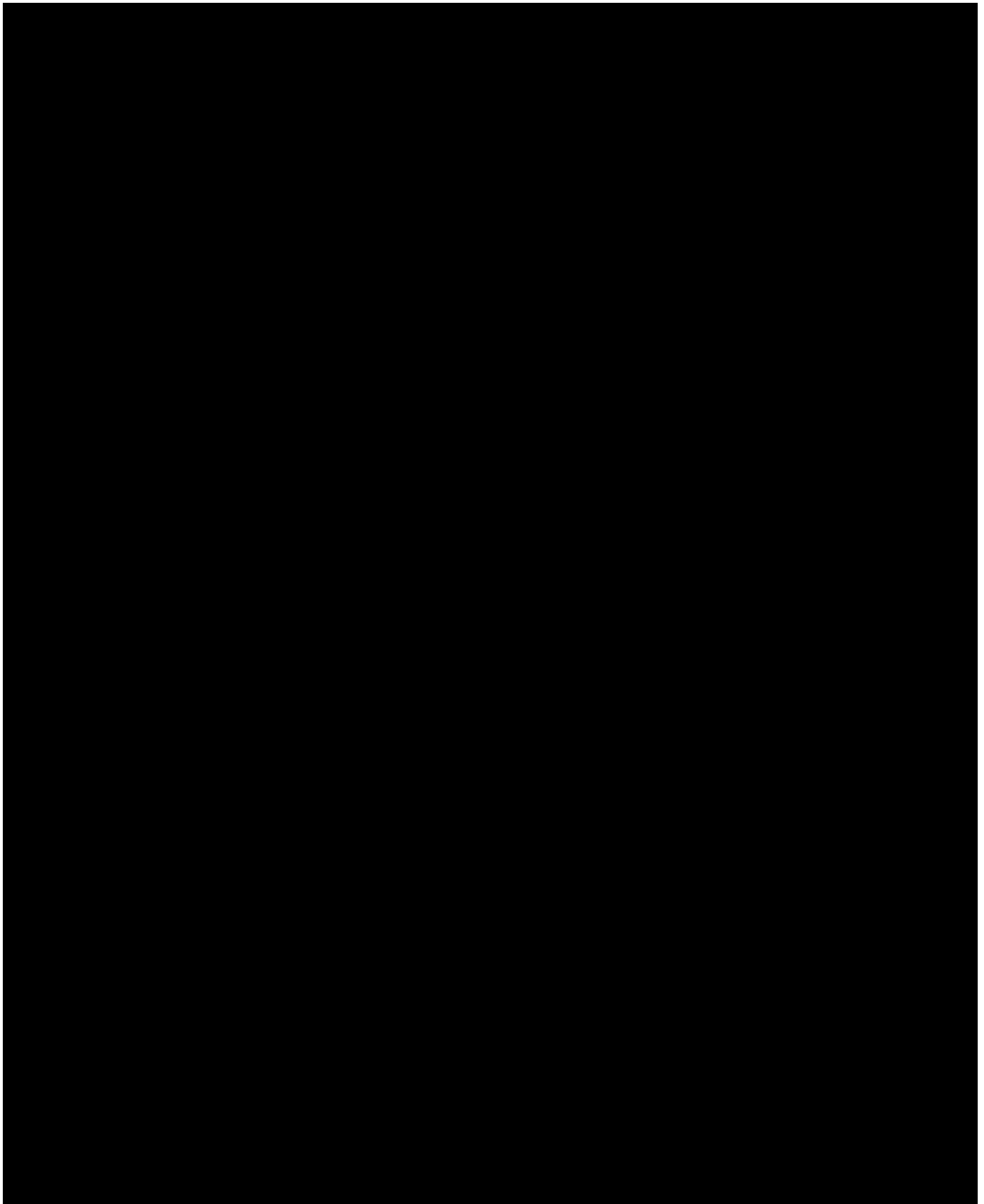
(b) (7)(E)

(b) (7)(E), (b)(6);(b)(7)(C)

**II.B    REPORT GOALS**

(b) (4), (b) (7)(E)

**II.C    ANALYTIC LIMITATIONS**

(b) (4), (b) (7)(E)

(b) (4), (b) (7)(E)

IV.     ANALYSIS

IV.A     ANALYTIC GOALS

(b) (4), (b) (7)(E)