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Test & Evaluation Plan for the Evaluation of Checkpoint Resource Management Training at Detroit Metropolitan Wayne County Airport

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Test & Evaluation Plan

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16. Abstract
This plan describes a test to evaluate the efficacy of Checkpoint Resource Management (CPRM) training at Detroit Metropolitan Wayne County Airport (DTW). In a baseline evaluation, Human Factors Engineers (HFEs) will observe the communications of security screeners, adherence to standard operating procedures, individual and bag flow, and timing of individual and bag screening procedures at DTW Checkpoint Red prior to the experimental group receiving CPRM training. Three weeks after the CPRM training, HFEs will return to Checkpoint Red for a follow-up evaluation. Data collection will be accomplished via live observation of the checkpoint activity, as well as through the use of video recordings from a closed-circuit security monitoring system of the checkpoint. Audio recordings and live monitoring of the verbal communications made between screeners using headsets will also be utilized for data collection purposes. Data collectors will be blind to the identity of experimental and control personnel. Analyses will focus on changes in security screener communications, as well as on screener errors and individual-flow efficiency.

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EXECUTIVE SUMMARY

This document is the test and evaluation plan for the baseline and follow-up evaluations of Checkpoint Resource Management (CPRM) training at Detroit Metropolitan Wayne County Airport (DTW). Security screeners at DTW Checkpoint Red will receive communication headsets 3 weeks prior to a baseline evaluation of Checkpoint Red screeners' effectiveness, efficiency, and communication skills. Following the baseline evaluation, eight screeners and two Checkpoint Security Supervisors (CSSs) at this checkpoint will be assigned to an experimental group that will undergo CPRM training. Another eight screeners and two CSSs will be designated as a control group and will not undergo training. Three weeks following the completion of CPRM training, a follow-up evaluation of the experimental and control group members will be conducted using the baseline evaluation measures. A comparison of the baseline results to follow-up results for experimental (i.e., CPRM trained) and control groups will be performed to determine the effects of CPRM training on screener performance.

In the baseline and follow-up evaluations, data collection will be acquired via live observation of the checkpoint activity, as well as through the use of video recordings from a closed-circuit security monitoring system of DTW's Checkpoint Red. Audio recordings and live monitoring of the verbal communications made between screeners using headsets will also be utilized for data collection purposes. Data collected will include frequency of errors in performing standard operating procedures, the time to perform the procedures, the volume of individuals and bags, the frequency and type of communications, observer ratings of checkpoint performance, and screener attitudes towards their work. Data collectors will be blind to the identity of experimental and control groups throughout the evaluation. During the course of data collection, procedures to collect reliability data for all these measures will be instituted.

Analysis of the data will examine experimental and control group performance on Measures of Performance before and after the experimental group receives CPRM training. The primary analytical statistics that will be performed are Chi-Square for data based on counts and frequencies and *t*-tests or F-tests for continuous data. Preliminary reports will be prepared to summarize the results of the baseline and follow-up evaluations, and a final report will discuss the comparison between pre-CPRM training (i.e., baseline evaluation) and post-CPRM training (i.e., follow-up evaluation) performance.

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ACRONYMS

BWTMD	Back Walk-Through Metal Detector
COIC	Critical Operational Issues and Criteria
CPRM	Checkpoint Resource Management
CRM	Crew Resource Management
CSS	Checkpoint Security Supervisor
DTW	Detroit Metropolitan Wayne County Airport
ETD	Explosives Trace Detector
FAA	Federal Aviation Administration
FWTMD	Front Walk-Through Metal Detector
HFE	Human Factors Engineers
HHMD	Hand-Held Metal Detector
LLNL	Lawrence Livermore National Laboratory
MOP	Measure of Performance
TEP	Test and Evaluation Plan
WTMD	Walk-Through Metal Detector

1. INTRODUCTION

Federal Aviation Regulation 108.17 requires that X-ray operators undergo initial and recurrent training to ensure the safety of airline individuals and their property. To comply, air carriers procure equipment and train personnel to screen individuals and their carry-on baggage before they board the aircraft. Furthermore, the Aviation Security Improvement Act, Public Law 101-604, mandates that the Federal Aviation Administration (FAA) enhances and improves X-ray baggage screener selection, training, and performance. The Aviation Security Human Factors Program (AAR-510) of the Office of Aviation Security Research and Development is the FAA unit tasked with the research and development responsibility.

1.1 Background

Communication and cooperation are essential to the effective and efficient operation of an aviation security checkpoint. These skills are not, however, emphasized in initial screener training, in remedial training, or in recurrent training. Initial, remedial, and recurrent training focus on teaching the primary skills required of a checkpoint screener, proper operation of the checkpoint equipment, and proper execution of checkpoint procedures to interdict threats at the checkpoint. Nonetheless, communication plays an important role in the operation of the checkpoint. X-ray screeners and bag checkers need to communicate to guarantee that proper search procedures are carried out. Front Walk-Through Metal Detector (FWTMD) operators must communicate with Back Walk-Through Metal Detector (BWTMD) operators/Hand-Held Metal Detector (HHMD) operators and the public to guarantee that all persons passing into the checkpoint have been properly screened. The Checkpoint Security Supervisor (CSS) or the screener-in-charge needs to communicate constantly with staff.

Crew Resource Management (CRM) training was developed in the aviation environment to improve communication and cooperation between members of an aircraft crew [1, 2]. CRM concepts have been exported to other environments with some success [3, 4]. Furthermore, Lawrence Livermore National Laboratory (LLNL) has developed a training program that adapts CRM concepts to security checkpoint operations. A pilot study assessing Checkpoint Resource Management (CPRM) training was conducted at San Francisco International Airport. Based on the results, a more thorough evaluation of the effectiveness of CPRM training in enhancing checkpoint performance should be conducted. The purpose of the current study is to resolve confounding findings from the pilot study.

1.2 Scope

The purpose of this project is to assess the impact of CPRM training on checkpoint security operations. A baseline evaluation of checkpoint operations at Detroit Metropolitan Wayne County Airport (DTW) Checkpoint Red will evaluate a group of screeners and CSSs, using measurements and techniques that have been used in a number of FAA checkpoint evaluations [5, 6].

These measures will be supplemented by new measures designed specifically to evaluate communication and cooperation between individuals at the checkpoint. All measures, including those previously established, will be subject to reliability analysis during the course of this evaluation. Following the baseline evaluation, half of the screener participants will be assigned to an experimental group who will be given CPRM training as part of their recurrent training. Three weeks after CPRM training is completed, Human Factors Engineers (HFEs), blind to the identity of experimental and control participants, will repeat the baseline measurements in a follow-up evaluation. Statistical comparisons between baseline and follow-up measures will allow for the determination of CPRM training effectiveness.

1.3 Baseline and Follow-up Critical Operational Issues and Criteria

Checkpoint operations can be subdivided into a set of discreet tasks performed by screeners and their supervisors [7]. Each task serves the overall mission of effectively deterring and detecting threats and efficiently processing individuals and their carry-on baggage. The evaluation of these factors begins with determining the Critical Operational Issues and Criteria (COIC) for checkpoint effectiveness and efficiency. COIC from a previous study of checkpoint security operations were modified to increase sensitivity to the types of behaviors that are the focus of CPRM training [7]. These techniques were expanded to include the evaluation of issues such as communication and teamwork at the checkpoint. Modifications were also made to previous COIC to improve methods for measuring individual volume during data collection, and a strategy for assessing the reliability of HFEs' data collection has been developed. Measures of Performance (MOPs) were identified to guide information gathering as needed to evaluate the issues in terms of whether or not criteria are met. Checklists were developed to acquire the information for the MOPs through observation of the checkpoint (both directly and with video cameras). This evaluation process is based on a foundation of checkpoint tasks and their underlying Knowledge, Skills, and Abilities [8]. Appendix A provides samples of the checklists.

1.3.1 Issue 1 - Screening of Individuals

Are checkpoint procedures, staffing, and equipment adequate to prevent individuals from carrying threats through the checkpoint? Does CPRM training affect the detection of prohibited objects on individuals?

> Criterion 1-1. Investigative in nature. There is an increase in effectiveness in screening individuals at the checkpoint after CPRM training.
>
> > MOP 1-1-1. Type and frequency of errors in FWTMD procedures for experimental and control groups during baseline and follow-up evaluations

MOP 1-1-2. Type and frequency of errors in divestment procedures for experimental and control groups during baseline and follow-up evaluations

MOP 1-1-3. Type and frequency of errors in HHMD procedures for experimental and control groups during baseline and follow-up evaluations

MOP 1-1-4. Type and frequency of errors in pat-down search procedures for experimental and control groups during baseline and follow-up evaluations

MOP 1-1-5. Number of screeners assigned to checkpoint positions for experimental and control groups during baseline and follow-up evaluations

MOP 1-1-6. Checkpoint Screener Effectiveness Ratings of FWTMD and BWTMD operators for experimental and control groups during baseline and follow-up evaluations

1.3.2 Issue 2 - Screening of Carry-On Baggage

Does CPRM training affect the detection of prohibited objects in carry-on baggage?

Criterion 2-1. Investigative in nature. There is an increase in effectiveness in screening bags at the checkpoint after CPRM training.

MOP 2-1-1. Type and frequency of errors in X-ray operations for experimental and control groups during baseline and follow-up evaluations

MOP 2-1-2. Type and frequency of errors in bag-search procedures for experimental and control groups during baseline and follow-up evaluations

MOP 2-1-3. Type and frequency of errors in trace procedures for experimental and control groups during baseline and follow-up evaluations

MOP 2-1-4. Checkpoint Screener Effectiveness Ratings of X-ray operators and ETD Operators/Bag Checkers for experimental and control groups during baseline and follow-up evaluations

1.3.3 Issue 3 - Throughput for Individual Screening

Do inefficient individual-screening procedures contribute to low throughput?

The frequency of all the individual screening activities (e.g., hand-wanding and pat downs) and the time that each takes will be recorded at the checkpoint during baseline data collection. These same measures will be recorded again in the follow-up data collection to determine whether CPRM training has an impact on the frequency or the duration of individual screening activities.

> Criterion 3-1. Investigative in nature. Throughput increases after CPRM training.
>
> > MOP 3-1-1. Amount of time to process each person through the BWTMD for experimental and control groups during baseline and follow-up evaluations
> >
> > MOP 3-1-2. Amount of time to process each person with a HHMD for experimental and control groups during baseline and follow-up evaluations
> >
> > MOP 3-1-3. Type and frequency of secondary screening procedures such as sending individuals through a BWTMD, hand-wanding, and pat downs for experimental and control groups during baseline and follow-up evaluations

1.3.4 Issue 4 - Throughput for Carry-On Bag Screening

Do inefficient baggage-screening procedures contribute to low throughput?

The frequency of all baggage screening activities (e.g., X-ray screening, physical bag searches, bag traces) and the time that each takes will be recorded at the checkpoint during baseline data collection. These measures will be recorded again during follow-up data collection in order to determine whether CPRM training has an impact on the frequency or the duration of baggage screening activities.

> Criterion 4-1. Investigative in nature. Throughput increases after CPRM training.
>
> > MOP 4-1-1. Amount of time for searching bags for experimental and control groups during baseline and follow-up evaluations
> >
> > MOP 4-1-2. Amount of time for using trace detection on bags for experimental and control groups during baseline and follow-up evaluations

MOP 4-1-3. Type and frequency of secondary screening procedures such as bag search and trace detection for experimental and control groups during baseline and follow-up evaluations

1.3.5 Issue 5 - Screener Communication and Cooperation with Co-Workers

Does CPRM training improve screeners' communication and cooperation with co-workers to carry out checkpoint operations?

Criterion 5-1. Investigative in nature. Relevance and frequency of conversations will be obtained from onsite observations of interactions as well as from recordings of conversations between security screeners transmitted using communication headsets. Timing data from person-to-person and event-to-event communications will be collected from Palm Pilot IIIxe recordings. Communication data will then be synchronized to timing data.

MOP 5-1-1. Number of times the FWTMD operator communicates with the BWTMD/HHMD operator for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-2. Number of times the FWTMD operator communicates with the exit aisle monitor the need for physical search of appropriate individuals and equipment for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-3. Number of times the FWTMD operator communicates with the CSS about unusual situations and equipment malfunctions for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-4. Number of times the FWTMD operator requests assistance from the CSS in handling special individuals for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-5. Number of times the FWTMD operator requests assistance from the CSS to relieve crowding for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-6. Number of times the FWTMD operator requests position relief from the CSS for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-7. Number of times the BWTMD/HHMD operator communicates with the CSS about unresolved alarms for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-8. Number of times the X-ray operator converses while the belt is running for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-9. Number of times the X-ray operator requests the bag check/ETD operator to look at an X-ray image prior to a bag search for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-10. Number of times the X-ray operator calls for a bag check on suspicious items for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-11. Number of times the X-ray operator calls a CSS for definite threat items for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-12. Number of times the X-ray operator communicates the need for a bag to be X-rayed a second time for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-13. Number of times the bag check/ETD operator consults with the X-ray operator about the location of suspicious items for experimental and control groups during baseline and follow-up evaluations

MOP 5-1-14. Number of times the CSS directs screeners to appropriate checkpoint positions during rotations for experimental and control groups during baseline and follow-up evaluations

1.3.6 Issue 6 - CSS Quality of Supervision

Does CPRM training affect the quality of CSS supervision?

Criterion 6-1. Investigative in nature.

MOP 6-1-1. Number of times the CSS supervises and corrects inappropriate actions from screeners for experimental and control groups during baseline and follow-up evaluations

MOP 6-1-2. Number of times the CSS questions individuals or screeners in possible threat situations for experimental and control groups during baseline and follow-up evaluations

MOP 6-1-3. Number of times the CSS directs the opening and closing of lanes and equipment as circumstances dictate for experimental and control groups during baseline and follow-up evaluations

MOP 6-1-4. Number of times the CSS responds to screeners' calls for assistance or supervision in unusual situations for experimental and control groups during baseline and follow-up evaluations

MOP 6-1-5. Frequency of proper procedures as measured by the CSS checklist for experimental and control groups during baseline and follow-up evaluations

MOP 6-1-6. Observers' ratings of CSS performance using the CSS Effectiveness Datasheet for experimental and control groups during baseline and follow-up evaluations

1.3.7 Issue 7 - Reliability of Checkpoint Measures

What is the reliability of checkpoint measures?

Criterion 7-1. Investigative in nature. All measures used in baseline and follow-up evaluations will be subject to periods when two independent observers will record the same measures for a particular event. These will form the core reliability data of the study. These data will be statistically analyzed to determine the interrater/interobserver reliability for the measures.

MOP 7-1-1. Interobserver reliability of checklists for experimental and control groups during baseline and follow-up evaluations

MOP 7-1-2. Interobserver reliability of counts and timing for experimental and control groups during baseline and follow-up evaluations

MOP 7-1-3. Interobserver reliability of Checkpoint Screener Effectiveness Ratings for experimental and control groups during baseline and follow-up evaluations

1.3.8 Issue 8 - Checkpoint Security Screener Satisfaction

Does CPRM training affect screeners' overall satisfaction?

Criterion 8-1. Investigative in nature. Security screeners' satisfaction with their jobs will be obtained from the Checkpoint Security Screener Satisfaction Survey.

MOP 8-1-1. Ratings on the Checkpoint Security Screener Satisfaction Survey will be obtained for experimental and control groups during baseline and follow-up evaluations

2. METHODOLOGY

2.1 Test Participants

An experimental group and a control group will be observed during baseline and follow-up evaluations. The experimental group will receive CPRM training, but the control group will not. Factors outside of the experimental manipulation will be controlled allowing for comparable groups. These factors include method of data collection, cost-of-living wage increases, and other factors that were encountered in the pilot study that we want to avoid during this experiment. Each of these groups will consist of 10 individuals, 8 screeners and 2 CSSs (N = 20).

2.2 Test Site

Data collection will be performed at DTW Checkpoint Red for both the baseline and follow-up evaluations. Checkpoint Red is the main point of entry for Northwest Airlines domestic flights at DTW. It is located in the Davey (North) terminal just behind the ticket counters. There are four Perkin-Elmer X-ray machines at this checkpoint. In addition, there are four FWTMDs, one adjacent to each X-ray machine. Two chutes, each between a pair of FWTMDs, feed into a BWTMD. Tables in the rear of the checkpoint are used for bag searches, and two ETD systems are located there as well. There are approximately six security cameras throughout the checkpoint, which are owned and operated by Wayne County. One camera offers a panoramic view of the whole checkpoint from within the sterile area. This camera will be a primary source of data for the baseline and follow-up evaluations.

Data will be collected for 1 week during the baseline evaluation and for 1 week during the follow-up evaluation. The follow-up evaluation will be conducted 3 weeks following CPRM training.

2.3 Test Personnel

Test personnel will consist of five HFEs. They will travel to DTW for both baseline and follow-up evaluations. The same individuals who perform the baseline evaluation will perform the follow-up evaluation.

2.4 Materials

2.4.1 Communications System

Prior to data collection, a communications system will be installed at Checkpoint Red. This system is a Motorola SP50+ 4 Watt 10 Channel, UHF Portable Radio with Otto-Behind-the-Head Mini-Boom microphones. Before any data collection takes place, a protocol for the assignment of channels to checkpoint security screeners will be created and HFE test personnel will be informed of these protocols.

2.4.2 CPRM Training

The CPRM training will involve security screeners' participation in a CPRM workshop. In this case, the workshop will be given as part of a group of screeners' recurrent training. The workshop was developed by personnel at LLNL and adapts principles taught in CRM training to the personnel and work environment of security checkpoints. The workshop is organized around six goals: understanding what CPRM is, understanding performance shaping factors and the role of these in predicting and managing team performance, principles for managing human error, CPRM 12 rules of thumb, understanding operational risk management, and keeping CPRM working.

2.4.3 Data Collection Measures

Data collection measures will be the same for both baseline and follow-up evaluations. The checkpoint evaluation data will be collected on standard forms (see Appendix A). Some of the datasheets have been revised from a previous evaluation to extend the evaluation to communication and cooperation issues [7].

Video records of checkpoint activities will be collected using Wayne County Airport Authority video equipment. These video records, as well as live monitoring of the video cameras, will be used to collect information using the standard forms. Some data will be collected exclusively from video records, specifically Forms 2 and 3, Individual Volume and Bag Volume, respectively.

Screener communications will also be monitored by an HFE during the checkpoint evaluation. The HFE will use specific protocols to record information while monitoring the communications channel. The protocols are called Communications One and Communications Two (see Appendix B). The protocols will consist of a set of codes familiar to the data collectors. These codes represent who is communicating with whom and what they are communicating about. Communications One is a code for individual processing and Communications Two is a code for baggage processing. Codes will be entered by an HFE using a Palm Pilot IIIxe personal computer, which will be running a program called RaceTimes v1.2. This program will allow push-button recording of a time stamp, as well as notes next to each time recorded.

Periodically, data collectors will rate each screener's performance at the checkpoint using a new data form, the Checkpoint Screener's Effectiveness Datasheet. This datasheet rates performance of each of the checkpoint operators on the following broad categories of performance: situation awareness, conformity to standard operating procedures, effective communication with the traveling public, and effective cooperation with other team members.

Screener attitudes towards their work and work environment will be assessed using a survey instrument adapted from a survey currently used by the FAA and Northwest Airlines. The survey will be administered to all 20 screeners after the baseline and then after the follow-up procedure.

2.5 Procedures

2.5.1 Baseline Evaluation

A set of 20 security employees will be randomly selected as test participants from a sample of screeners who are eligible for recurrent training. The selection of test participants will be conducted by the screening company operating at Checkpoint Red (International Consultants on Targeted Security [ICTS]). HFEs will be supplied with the names, pictures, duties, and schedules of the 20 test participants, so that the researchers can organize the data collection. This information will be obtained before traveling to DTW for the data collection.

As mentioned, a communications system will be installed and used for 3 weeks prior to the data collection. Three weeks after the baseline data have been acquired and CPRM training has been offered, HFEs will begin the follow-up checkpoint evaluation. These intervals will permit checkpoint security personnel to adapt to the changes and to establish a stable performance pattern. Baseline and follow-up data collection efforts will require a group of five HFEs to spend 2 weeks at DTW. One week will be used for a baseline evaluation, and the second week will allow for a follow-up evaluation.

The standard protocol is to unobtrusively observe the checkpoint to gather checkpoint status information, as well as, information about any significant occurrences in real time. Checkpoint data collection will require multiple sessions of real-time observation and review of video and audio recordings to completely and accurately fill out checklists for each screener position. When data collection is not feasible from the video cameras, HFEs will position themselves inside two businesses located next to Checkpoint Red to collect real-time data. These locations will allow HFEs to collect data without being detected by the screeners. This strategy greatly decreases interaction with checkpoint personnel. It is optimal because it minimizes the Hawthorne effect from the obvious presence of data collectors and provides the ability to collect and review data off-line [7].

Data recording sessions will take place for up to 20-minute intervals. This interval is long enough to record data during screener position rotations and short enough that HFEs will not be overly fatigued before they take a break. Immediately following a 20-minute data collection effort, each HFE will fill out the Screener Effectiveness Datasheet.

HFEs will monitor the overall progress of the data collection by using a checklist. This checklist is shown in Appendix C. HFEs will also provide the 20 test participants with the Checkpoint Security Screener Satisfaction survey to obtain satisfaction ratings. This survey is shown in Appendix D.

2.5.2 Follow-Up Evaluation

In mid-April, 10 of the 20 test participants will receive CPRM training. This training, developed by LLNL, was presented to the trainers at DTW in a train-the-trainer session in mid-February.

The strategy in the follow-up evaluation data collection will be identical to that used in the baseline evaluation data collection. The same procedures and the same type of data will be collected. An important element of the experimental design is that the CPRM-trained participants (i.e., the experimental group) will be unknown to the HFE data collection team. At the time data are collected, the HFEs will not know who is part of the experimental group and who is part of the control group.

2.6 Data Analysis

A Microsoft Excel® database, capable of containing the information gathered from data collection forms and presenting useful summary information, will be constructed. At this time, the data collection team will be provided with information about who received and who did not receive CPRM training so that data may be appropriately labeled in the database.

The primary objective of the baseline and follow-up evaluations is to evaluate any changes in screener performance resulting from CPRM training. The analyses will compare screeners' effectiveness and efficiency, as well as their communication skills pre- and post-CPRM training at Checkpoint Red. As indicated previously, the primary statistical tools will be Chi-Square, *t*-test, and F-test. If significant performance changes occur, HFEs will attempt to determine the basis for the changes. When data are frequencies and counts, Chi-Square analysis will be used to compare pre- and post-CPRM differences. Timed data, such as duration, will be analyzed by *t*-tests or F-tests, where appropriate.

The same individuals observed during baseline data collection will be observed during follow-up data collection. This will enable HFEs to conduct within-groups data analyses using standard parametric and non-parametric statistical methods. Inter-observer reliability measures will be derived using a "shadow" data collector. The shadow data collector will collect simultaneous performance measurements as another data collector for the exact same participant. The two observations of the same person and event will provide critical reliability information about the data collection methods used in the checkpoint evaluations.

Evaluating the COIC may be affected by the amount of activity at the checkpoint as well as the amount of security personnel and equipment available. During the baseline evaluation, this information will be gathered at each checkpoint. This will include the number of X-ray machines, FWTMDs, BWTMDs, HHMDs, and ETD systems available during data collection events. The number of screeners on duty (by position) and supervisors will also be noted, along with the volume of individuals and bags being screened. If necessary, these nuisance variables will be statistically controlled.

2.7 Limitations

The checkpoint evaluations planned in this study is unprecedented in a number of ways. New types of data are being collected, which require new data collection and analysis

strategies. Performance of individual screeners is being tracked rather than simply whoever is staffing a particular position. Additionally, new techniques are being introduced to measure checkpoint reliability and checkpoint volume. All of these procedures introduce some risks for the overall effort. Hence, some strategies have been developed for dealing with these risks.

For many of the MOPs, particularly frequency counts for infrequent events, there may not be sufficient data in a 20-minute time span to provide a reliable estimate of a MOP on an individual basis. If necessary, HFEs will plan for focusing data collection in areas where data are needed in the last few days of the evaluation. Nonetheless, for these MOPs, baseline and follow-up data collection for experimental and control groups may need to be analyzed using pooled data.

There may be a loss of security personnel between the baseline and follow-up evaluations. To prepare for this possibility, the plan provides for 10 screeners in each group, but if necessary, the TEP goals can be accomplished with only 8 screeners.

Following each data collection effort (i.e., baseline and follow-up evaluations), the data will be summarized in a preliminary data report. Each report will describe the procedures used, the analyses performed, and the data collection findings.

A final test and evaluation report will present a more extensive discussion of the processes involved in collecting the field data, the results of the statistical analyses, and any limitations during this project. The final report will evaluate the effectiveness of CPRM training and will include a detailed analysis that compares baseline results to follow-up results. It will also include lessons learned to guide future research efforts.

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7. Fobes, J., Snyder, M. D., & Klock, B. A., “Checkpoint Effectiveness and Efficiency Evaluation,” (DOT/FAA/AR-00/07), DOT/FAA William J. Hughes Technical Center, Atlantic City International Airport, NJ, 1999.

8. Fobes, J., & Neiderman, E., “The Training Development Process for Aviation Screeners,” (DOT/FAA/AR-97/46), DOT/FAA William J. Hughes Technical Center, Atlantic City International Airport, NJ, 1997.

APPENDIX A
EVALUATION CHECKLISTS FOR CHECKPOINT TASKS

Form 1

Security Personnel and Equipment

Date _____ Time _____

Number of Personnel

X-Ray Screeners	_____
Bag Checkers	_____
Trace Operators	_____
FWTMD Operators	_____
BWTMD Operators	_____
CSSs	_____
Hand-Held Metal Detector Operators	_____

Amount of Equipment

X-Ray Machines	_____
FWTMDs	_____
BWTMDs	_____
Hand-Held Metal Detectors	_____
ETDs	_____

Form 2

Individual Volume

Individual Volume
Screener_____ FWTMD #_____ Date_____

BWTMD OP_____ Com File_____ Reliability Check_____

Begin Time	FWTMD	FWTMD REMAG	BWTMD	Hand-wand	Pat Down	Notes:

Form 3

Bag Volume

Bag Volume
Screener_____ X-ray #_____ Date_____

BS /Trace OP_____ Com File_____ Reliability Check_____

Begin Time	Number X-rayed	Number Searched (Whole/Limited)	Number Traced	Notes:

Form 4

X-ray Operations

X-Ray Operations

Screener_____ X-ray #_____ Date_____

Bag/Trace OP_____ Com File_____ Reliability Check_____

Begin Time	Fails to Orient to Monitor	Calls for Bag Check	Stops Belt to Look	TIP Bag	Redirects Individual/Bag	Communicates Need for Re-X-ray	Conversations with Belt On	Communicates with CSS	Notes:

Form 5

Form 5

Trace Operations

Trace Operations
Screener_____ X-ray #_____ Date_____

X-ray OP_____ Com File_____ Reliability Check_____

Begin Time	Individual	No Errors	Fails to Acquire Consent	Fails to Maintain Control	Fails to Carry Bag By Sides	Fails to Swab Zippers, Etc.	Fails to Swab Handle Last	Only 1 Bag on Table	Duration	Receives Call for Bag Check	Acknowledges Request	Calls CSS to Consult	Performs Alarm Resolution	Notes:

Form 6

FWTMD

FWTMD
Screener_____ FWTMD #_____ Date_____

BWTMD OP_____ Com File_____ Reliability Check_____

Begin Time	Allows Items Thru WTMD	Fails to Check Divest Tray	Fails to Check Carried Items	Fails to Check Electronics	No Transition to 2nd WTMD	Inattention to Individuals	Communicates Need to Divest to Proceed Thru WTMD	Communicates With Special Individuals	Communicates With CSS	Communicates With 2nd WTMD	Notes:

Form 7

BWTMD

BWTMD
Screener_____ BWTMD #_____ Date_____

FWTMD OP_____ Com File_____ Reliability Check_____

Begin Time	Fails to Check Divest Tray	Fails to Direct Thru WTMD	Fails to Monitor Alarm Status	BWTMD Duration	Fails to Ask Per-mission	Fails to Direct for Hand-wand	Fails to Ask to Spread Arms	Touch With Hand-wand	Fails to Outline Body	Fails to Check Front/ Back of Individual	Fails to Positively ID Each Alarm	Fails to Resume Wanding at Alarm	Fails to Inspect Belt Buckle/ Hat	Fails to Check Ankles & Back	Fails to Direct For Pat Down	Receives FWTMD Communi-cations	Communi-cates Need to Divest to Proceed Thru WTMD	Communi-cates With Special Individuals	Communi-cates With CSS	Hand-wand Duration	Notes

Form 8

Bag Search

Bag Search

Screener_____ X-ray #_____ Date_____

X-ray OP_____ Com File_____ Reliability Check_____

Begin Time & (B/P)	No Errors	Limited/ Whole Bag Check (L/W)	Fails to Ask Permission	Fails to Maintain Control of Bag	Fails to Check All Pockets	Fails to Open Bag Toward Self	Fails to Check in Circular Pattern	Fails to Check Top, Bottom, & Sides of Bag	Fails to Check Through Layers of Clothing	Fails to Check Individual Containers Within Bag	Fails to Restrict Individual Access to Contents of Bag	Duration	Receives Call for Bag check	Acknowl-edges Request	Requests Re-X-ray	Calls CSS to Consult	Notes:

Form 9

Checkpoint Security Supervisor

Checkpoint Security Supervisor

Date_____ Data Collector_____ CSS ID_____ Start Time_____

Begin Time	Paperwork	Screener Functions	Individual Screener Supervision	Rotates Screeners	Tests Screeners	Equipment Testing	Watches Checkpoint	Communicates to Screeners	Communicates to Individuals	Open/Close Lane	Notes:

Form 10

Checkpoint Screener Effectiveness Datasheet

Screener _____ Date / Time _____

Position_____ Equipment _____

Maintains Vigilance in Screening _____

Performs Duties Using the Standard Operating Procedures _____

Effectively Communicates With the Traveling Public _____

Effectively Communicates / Cooperates With Other Team Members _____

Overall Performance at the Checkpoint _____

Overall Team Performance During this Interval _____

Scale

1 Poor	Screener is performing **few**, **if any**, duties as outlined in the Checkpoint Operations Guide (COG) and continually fails to communicate with individuals and/or colleagues.
2 Minimal	Screener is performing **some** duties as outlined in the Checkpoint Operations Guide (COG) and communicates with some individuals and/or colleagues.
3 Standard	Screener is performing **most** duties as outlined in the Checkpoint Operations Guide (COG) and communicates with most individuals and/or colleagues.
4 Outstanding	Screener is performing **all**, duties as outlined in the Checkpoint Operations Guide (COG) and communicates with all individuals and/or colleagues.

Form 11

Checkpoint Security Supervisor Effectiveness Datasheet

Screener _____ Date / Time _____

Position_____ Equipment _____

Is continuously aware of what is going on at the checkpoint _____

Enforces Standard Operating Procedures and corrects errors _____

Provides Clear Direction in Problem Situations _____

Effectively Communicates with the Traveling Public _____

Effectively Communicates / Cooperates with other Team Members _____

Overall Performance at the Checkpoint _____

Overall Team Performance During this Interval _____

Scale

1 Poor	Supervisor is performing **few**, **if any**, duties as outlined in the Checkpoint Operations Guide (COG) and continually fails to communicate with individuals and/or colleagues.
2 Minimal	Supervisor is performing **some** duties as outlined in the Checkpoint Operations Guide (COG) and communicates with some individuals and/or colleagues.
3 Standard	Supervisor is performing **most** duties as outlined in the Checkpoint Operations Guide (COG) and communicates with most individuals and/or colleagues.
4 Outstanding	Supervisor is performing **all**, duties as outlined in the Checkpoint Operations Guide (COG) and communicates with all individuals and/or colleagues.

APPENDIX B
COMMUNICATIONS WORKSHEET

FORM 12

COMMUNICATIONS ONE WORKSHEET ---- INDIVIDUAL PROCESSING

FB (FWTMD to BWTMD Communications)
FB 1 Alerts B to individual coming
FB 2 Answers query from B

BF (BWTMD to FWTMD Communications)
BF 1 Requests information about individual
BF 2 Conversation

FC (FWTMD to CSS Communications)
FC 1 Requests assistance in handling special individual
FC 2 Request assistance to relieve crowding
FC 3 Requests relief
FC 4 Informs CSS of malfunction

CF (CSS to FWTMD Communications)
CF 1 Acknowledges request
CF 2 Orders change in personnel
CF 3 Corrects procedural error
CF 4 Requests Information

BC (BWTMD to CSS Communications)
BC 1 Requests assistance in handling special individual
BC 2 Request assistance to relieve crowding
BC 3 Requests relief
BC 4 Informs CSS of malfunction

CB (CSS to BWTMD Communications)
CB 1 Acknowledges request
CB 2 Orders change in personnel
CB 3 Corrects procedural error
CB 4 Requests information

FORM 13

COMMUNICATIONS TWO WORKSHEET ---- BAG PROCESSING

XB (X-ray to Bag Search/Trace Communications)
XB 1 Informs B of need for a bag search / trace
XB 2 Answers query from B

BX (Bag Search/Trace to X-ray Communications)
BX 1 Requests information about bag
BX 2 Conversation

XC (X-ray to CSS Communications)
XC 1 Requests assistance in resolving threat
XC 2 Request assistance for other reasons
XC 3 Requests relief
XC 4 Informs CSS of malfunction

CX (CSS to X-ray Communications)
CX 1 Acknowledges request
CX 2 Orders change in personnel
CX 3 Corrects procedural error
CX 4 Requests information

BC (Bag Search/Trace to CSS Communications)
BC 1 Requests assistance in resolving threat
BC 2 Request individual related assistance
BC 3 Requests relief
BC 4 Informs CSS of trace malfunction

CB (CSS to Bag Search/Trace Communications
CB 1 Acknowledges request
CB 2 Orders change in personnel
CB 3 Corrects procedural error
CB 4 Requests information

APPENDIX C
STRATEGIC DATA COLLECTION CHECKLIST

FORM 14

STRATEGIC DATA COLLECTION CHECKLIST

Screener ID	FWTMD	BWTMD/ Hand-wand	X-ray	Bag Check	Trace
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

APPENDIX D
SCREENER SATISFACTION SURVEY

Form 15

Checkpoint Security Screener Satisfaction Survey

Name_____

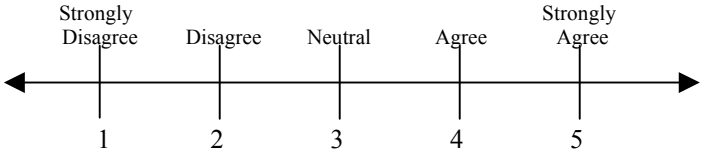
1. How long have you been a screener? _____Years _____Months

2. How long have you been using X-ray equipment to screen baggage?
   _____Years _____Months

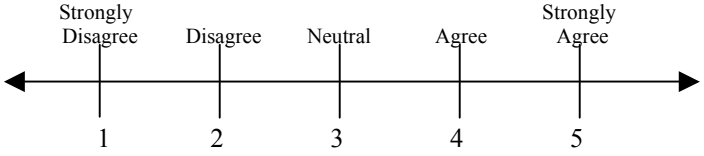
3. Circle the highest education level that you have completed.
   Elementary School High School College or University

4. Position at airport (check all that apply):
   _____CSS
   _____Screener
   _____Manager
   _____Instructor

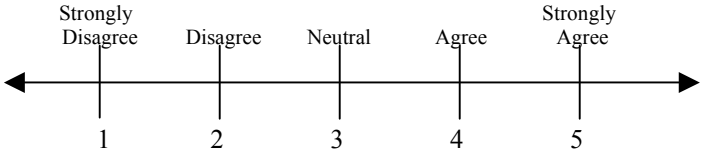
5. I feel I have a good understanding of ICTS's business strategy and direction.



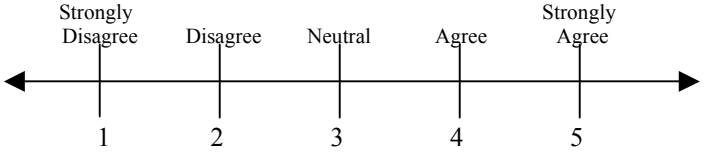
6. ICTS is committed to providing high quality and reliable customer service.



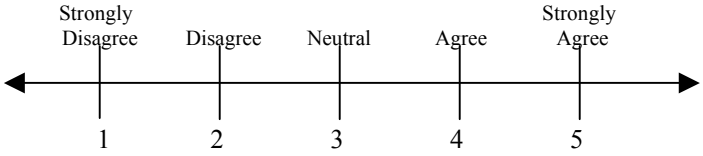
7. I have an understanding of the goals and objectives of my job as a checkpoint screener.



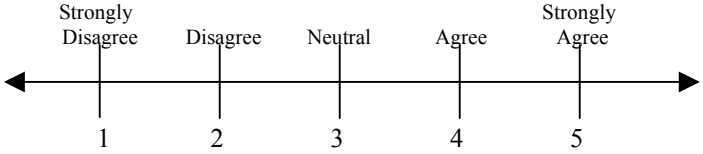
8. My individual performance goals/expectations are clear.



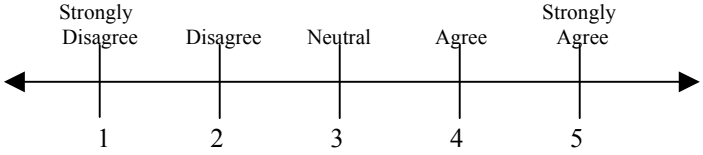
9. I can see how my job responsibilities contribute to ICTS's overall goals and objectives.



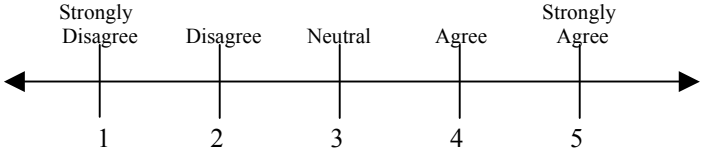
10. I receive enough feedback on how well I do my work.



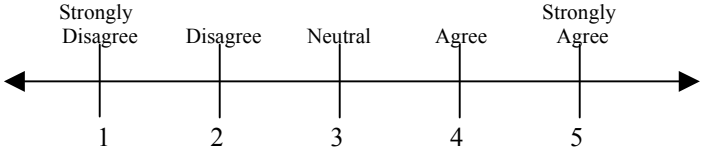
11. I receive appreciation by my supervisors.



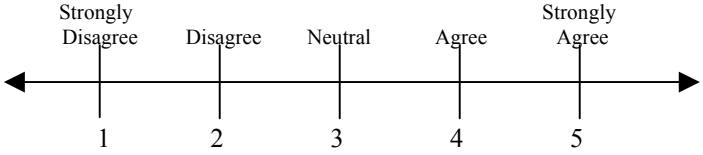
12. Overall, I have the resources to do my job well.



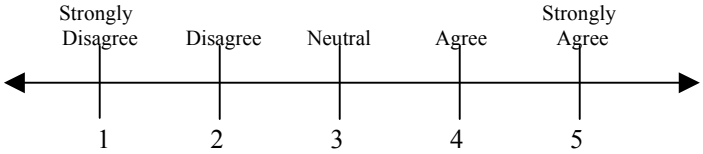
13. To do my job well and deliver high quality customer service, I have received the training I need (both on the job and formal training).



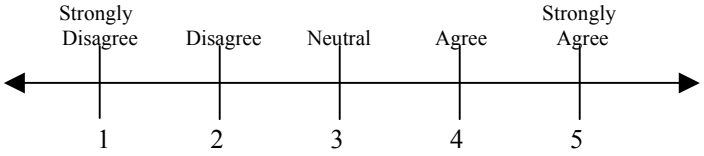
14. To do my job well and deliver high quality customer service, I receive help and support from my immediate supervisor when I need it.



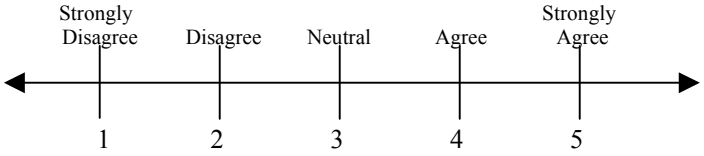
15. To do my job well and deliver high quality customer service, management provides support when needed.



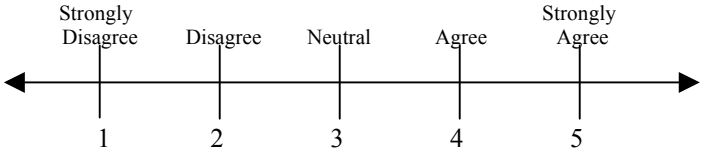
16. To do my job well and deliver high quality customer service, I have the authority I need.



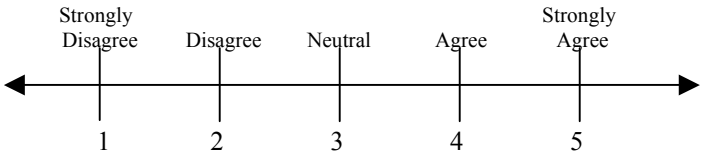
17. To do my job well and deliver high quality customer service, I receive the job information I need.



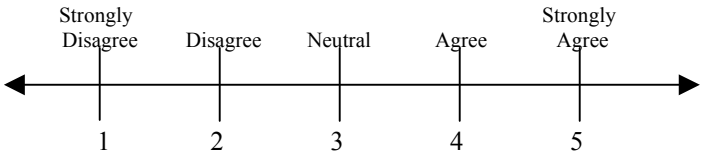
18. To do my job well and deliver high quality customer service, I have access to the tools and equipment I need.



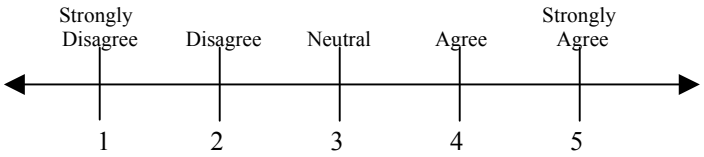
19. To do my job well and deliver high quality customer service, I have access to the material or parts I need.



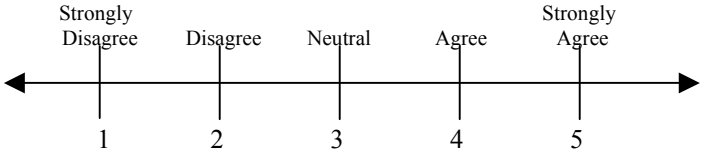
20. To do my job well and deliver high quality customer service, I receive the cooperation that I need from ICTS.



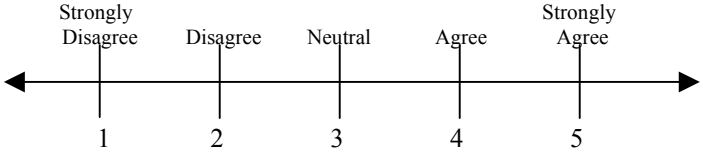
21. To do my job well and deliver high quality customer service, I receive the cooperation that I need from co-workers.



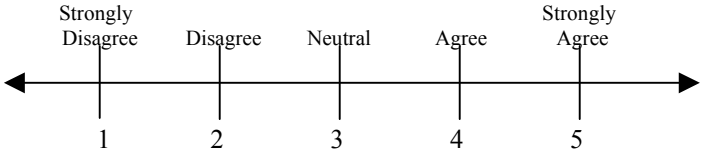
22. ICTS provides satisfactory physical working environment and facilities for employees.



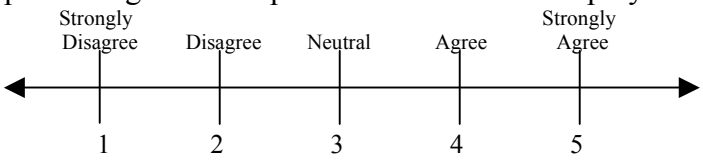
23. Our policies and work procedures make sense and help deliver high quality service.



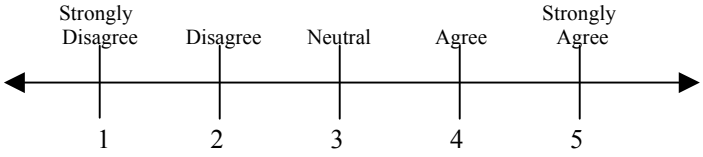
24. My manager is receptive to ideas and suggestions to improve performance.



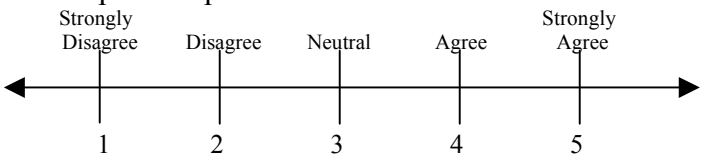
25. ICTS expects a high level of performance from its employees.



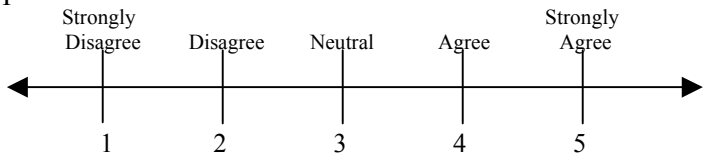
26. All in all, ICTS has sufficient staff to accomplish our goals and objectives.



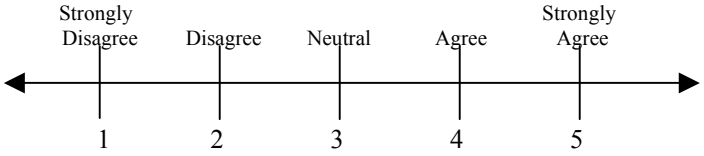
27. ICTS strives to provide professional and effective service to meet our customer needs.



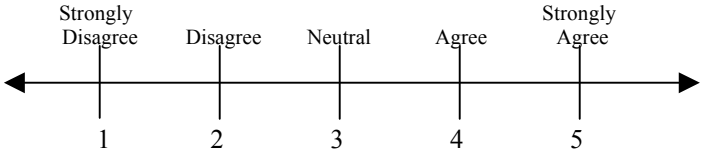
28. When a crisis occurs, ICTS employees work well together to get the problem solved as soon as possible for our customers.



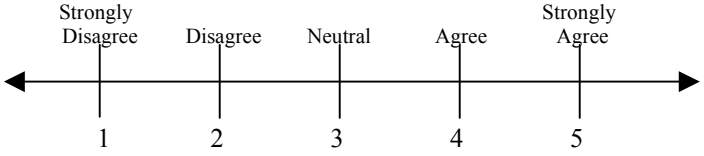
29. ICTS is investing in the technology necessary to deliver high quality customer service.



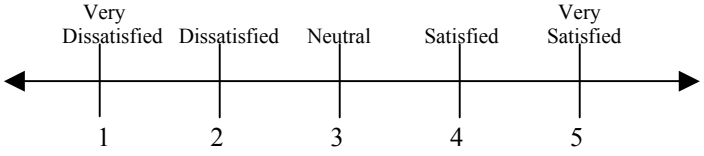
30. ICTS wants employees to meet customer needs, even when it involves temporarily overriding a policy.



31. I am optimistic about ICTS's future business prospects.



32. Considering everything, how would you rate your overall satisfaction of ICTS at the present time?



THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SURVEY.