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TSA SME Panel Project

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SME Panel Meeting Report 2: Draft Section 4 Indicator List

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INTRODUCTION

The Screening of Passengers by Observation Techniques (SPOT) is the behavior detection program implemented by the Transportation Security Administration (TSA). The SPOT Program is housed within the Behavior Detection and Analysis (BDA) Program, part of the Threat Assessment Capabilities Branch of the Checkpoint Technologies Division in the Office of Security Capabilities (OSC). This program is unique from TSA's other layers of security because it uses behavior-based observation techniques to identify individuals who may pose a threat to aviation and/or transportation security.

At the core of the program, Behavior Detection Officers (BDOs), who are specifically trained on the SPOT approach, observe and assess passengers for certain pre-specified indicators—nonverbal, verbal, and physiological reactions that are thought to be associated with fear of discovery. The BDOs conduct operations primarily at security checkpoints, positioned where they can optimally observe travelers throughout the area as well as at stress points (e.g., approaching or near the travel document checker [TDC], canines, and/or explosive trace detection [ETD] swabs). In addition, BDOs can function as stress points themselves by engaging with passengers. Observing and interacting with passengers at checkpoints, BDOs are looking for behavioral patterns that are anomalous to the environmental baseline and may signal a need for further screening. Because behavior detection techniques are unobtrusive, threat agnostic, applied in real time, and free of large equipment, BDOs may implement these methods in a variety of settings and checkpoint configurations. The primary instrument that BDOs use in this process is the SPOT Referral Report, which lists the indicators of interest and is structured to reflect the SPOT process and how passengers are identified for further screening.

In support of TSA's behavior detection capabilities, the American Institutes for Research (AIR) is engaged in a study to help BDA refine and optimize its behavior detection method. As part of this process, AIR organized and led two Subject Matter Expert (SME) Panel meetings in November 2013 and February 2014. Participating SMEs included academic experts, operations personnel, and select AIR staff with deep knowledge of behavior detection methods, threat assessment and the SPOT Program. Following the November 2013 meeting, AIR worked closely with TSA threat assessment/behavior detection experts to analyze and apply Panel feedback, developing a revised Section 2 (Observation and Behavior Analysis) indicator set as the first step in the indicator refinement process.

This report describes AIR's subsequent efforts regarding indicator refinement, following the February 2014 SME Panel meeting. Here, we present a summary of our efforts before, during, and after the most recent two-day meeting as well as the proposed revised Section 4 (Signs of Deception) indicator set. First, in the *Methods* section, we present information on the SME Panel members, some of whom are new to the Panel; a description of materials developed for the meeting; and an overview of the process used to examine and elicit input on the Section 4 indicators. Next, in *Results*, we present proposed changes to particular indicators from Section 4.

Last, we discuss *Next Steps* in terms of both indicator and process optimization, and how these preliminary results may inform larger SPOT Program evaluation efforts.

METHODS

This section provides an overview of methods used in the indicator optimization process to date. Here, we present the list of SME Panel members as well as materials developed and processes followed during the two-day meeting.

Participants

The SME Panel included a diverse group of individuals with expertise in behavior detection, research methodology, and/or the SPOT Program. Exhibit 1 lists the members and their affiliations. Select AIR staff with expertise in the SPOT indicator list and process, analysis of SPOT operational data, and behavior observation/coding also participated.

Exhibit 1. SME Panel Members

Attendees	Affiliation
External Subject Matter Experts	
Coral Dando, Ph.D.	Reader in Cognitive Psychology, University of Wolverhampton, United Kingdom
Paul Ekman, Ph.D.	Professor Emeritus in Psychology, University of California, San Francisco
Christian Meissner, Ph.D.	Professor of Psychology, Iowa State University
John Monahan, Ph.D.	Professor of Psychology, Professor of Law, University of Virginia
Helene Mullaney, M.A.	Deloitte Consulting
Transportation Security Administration	
Jennifer King Blanchard	TSA, Office of Security Capabilities, Threat Assessment Capabilities Branch
Alvin Brooks	TSA, Office of Security Operations
Jon Carter	TSA, Expert Behavior Detection Officer, SPOT Program
Donald Mancuso	TSA, Office of Security Capabilities, Threat Assessment Capabilities Branch
Lori McCullough	TSA, Transportation Security Manager, SPOT Program
Sarah Moeller	TSA, Office of Security Capabilities, Threat Assessment Capabilities Branch
American Institutes for Research	
Tracy Costigan, Ph.D.	AIR, Principal Research Scientist, BDA Program Research Principal Investigator
Zodie Makonnen, M.Ed.	AIR, Senior Research Scientist, Indicator Optimization Task Leader
Tanya Taylor, Ph.D.	AIR, Research Analyst
Emily Baumann, M.A.	AIR, Research Associate
Michele Toplitz, B.A.	AIR, Research Associate
Note takers	
Kaylie Clark, B.A.	AIR, Research Assistant
Claire Bocage, B.A.	AIR, Research Assistant

Biographical sketches for each SME Panel member are included in Appendix A.

Materials

In preparation for the second SME Panel meeting, AIR staff prepared several documents, adapting materials developed for the initial meeting that proved to be useful tools in fostering productive discussion. Materials included a note-taking grid (included below, in the *Process* section), a list of Section 4 indicators, and an expanded Summary Document. Initially developed for the first SME Panel meeting, the Summary Document (AIR Deliverable 2.1.2; AIR, 2013) presented information on all Section 2 indicators, including operational definitions (descriptions and exemplars) and related research findings. For the second meeting, we expanded the Summary Document to include this same information for indicators from Sections 4. A description of the Summary Document is presented here.

Summary Document

During the Panel meeting, the Summary Document functioned as a tool around which group discussions specific to Section 4 indicators occurred. We have included the introductory language from the Summary Document here to serve as an explanation of the various pieces of information provided for each indicator. While this is very similar to what members received for the initial meeting, some elements have changed; for example, we conducted an exploratory factor analysis (EFA) with the Section 4 indicators as was done with the Section 2 set previously.

The following text is extracted from the introduction of the expanded Summary Document.

Introduction

The Summary Document serves as a reference tool that presents comprehensive, current, and research-based information on suspicious indicators from the SPOT Referral Report. It is the primary document used in the ongoing indicator refinement process.

Below, we provide a guide to help the reader navigate the Summary Document. For each indicator, we present the same information in a standardized, two-page format. Here we lay out this format and provide background on sources of information and the significance of the analyses conducted.

Page 1: Indicator Information

The first page of each indicator-specific section presents information from TSA's SPOT Referral Report and the accompanying SPOT Behavioral Indicator Reference Guide. Each field and its corresponding description are listed here:

- *Indicator Name:* The indicator wording as it appears on the SPOT Referral Report.[1]
- *Referral Report Section(s):* Lists the section(s) where the indicator can be found on the SPOT Referral Report.
- *Indicator Number:* Number assigned to the indicator by the research team to facilitate simultaneous review of multiple indicator-specific documents.
- *Description:* The behavioral description or operational definition that corresponds to the indicator label on the SPOT Referral Report. The SPOT indicator descriptions are part of a standardized manual meant to guide the BDO on assessing passenger points.
- *Assessable and Non-Assessable Exemplars:* Examples of instances in which the indicator may and may not be assessed. These are not comprehensive but meant to provide the BDO with relevant and common examples of how the indicator may look in the operational setting.

Exhibit 2 presents current indicator information used by the BDO Program, extracted from the SPOT Program's Behavioral Reference Guide (BDA, 2011).

Exhibit 2. Template of Indicator Label, Definition and Exemplars

Indicator Name	
Referral Report Section(s):	Indicator Number – DEC XX

Description
[Description of indicator.]

Assessable Exemplars	**Non-Assessable Exemplars**
Example 1	Example 1
Example 2	Example 2
Example 3	Example 3

[1] This document references the SPOT Referral Report (Version 4.0; revised 23 February 2009). Since February 2009, the SPOT Program began using newer versions of the instrument (Version 3.0; revised 09 April 2013 and again on 15 November 2013). However, since operational data used in the updated analyses span from 2006 to 2012, we reference the previous version (Version 4.0) that was in use during this time. Despite the recent revisions, the content of the screening instrument (i.e., the suspicious indicators) for our purposes remain largely unchanged.

Page 2: Research Evidence

For all Section 4 (Signs of Deception) indicators, the second page of each indicator-specific section presents results of various analyses from several different sources. From AIR's previous work on Project Hostile Intent (2005-2011), we draw on findings from the SPOT Validation Study.[2] Analyses were updated here to include operational data through 2012.

For each indicator, this second page consists of a multi-part table, which presents results from various analyses. Below is a brief description of each section included in the table:

- *Frequency of Occurrence*. The percentage of time the particular indicator occurred, in proportion to all indicators observed, as well as the trend in indicator occurrence (up, down, stable). *Note that for all Section 4 indicators, frequency values are extremely low, often less than 1.0%, within and across years.*

- *Ranks*. This represents the degree of variation in the use of indicators across a set of stable setting characteristics (Year, Quarter, Location, and Hub size). The indicators were ranked from most frequent to least frequent overall. This table also includes results of indicator use by Hub size as one example of potential consistency or variation in indicator use. Hub sizes included in the analyses were: Large, Medium, and Small. (Non-Hub Primary was excluded from analyses due to small sample sizes.) Ranks were designated into a quartile: quartile 1 (i.e., the 25% most frequently observed indicators); quartile 2 (i.e., the middle 50% of the indicators); and quartile 3 (i.e., the 25% least frequently occurring indicators).

- *Item-Level Predictive Utility*. The predictive utility of individual indicators was examined by calculating the association between the presence/absence of each SPOT indicator and the presence/absence of each of the four outcomes (*LEO Arrest, Possession of Prohibited/Illegal Items, Possession of Fraudulent Documents,* and the *Combined Outcome*). Significance tests that assessed the associations between indicators and outcomes were computed for each 2×2 table (i.e., each indicator × outcome pair). Corresponding Pearson's χ^2 values and significance were computed; in instances when the Pearson's χ^2 assumption (that minimum expected cell counts are greater than 5) was not met, Fisher's exact test statistics and significance levels were reported instead.[3]

  Odds ratio (OR) statistics were also produced for each pair in order to describe the ratio of the odds of a positive outcome among those exhibiting a given indicator to the odds of a positive outcome among those not exhibiting a given indicator. Confidence Intervals (CIs) associated with each OR were also produced. Note that the analyses were one-

[2] Costigan, T. E., Makonnen, Z. E., Taylor, T. S., Sawyer, K., Myers, T. L., & Toplitz, M. (2011). *SPOT referral report validation study final report: Volumes 1-4*. Washington, DC: American Institutes for Research.

[3] Fisher, R. A. (1922). On the interpretation of $\chi 2$ from contingency tables, and the calculation of P. *Journal of the Royal Statistical Society, 85*, 87–94.

directional and focused on positive ORs only, or the extent to which the presence of indicators increased the odds of a given outcome.

These analyses were conducted with stratified subsets (i.e., the Operational SPOT dataset was randomly split into two subsets, balanced by year). This allowed for an examination of stability in the results. In the tables, we present only results from the first subset to simplify information presented.

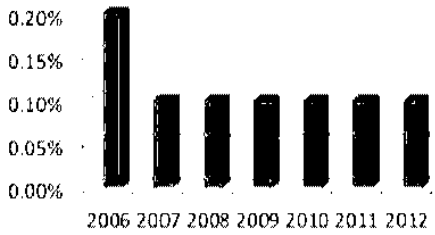
- *Factor Analysis.* AIR also conducted an exploratory factor analysis (EFA) of the SPOT Referral Report Section 4 indicators. This analysis served as an initial step in the examination of construct-related validity. Results of the EFA produced a two-factor model, which appeared to represent two prototypical traveler profiles: *Scripted but Terrified* and *Strategically Verbally Avoidant*. Again, the EFA was conducted with stratified subsets (i.e., the Operational SPOT dataset was randomly split into two subsets, balanced by year). This allowed for an examination of stability in the results. The results for the two subsets are presented in the summary table. Factor loadings greater than approximately .40 are considered strong; factor loadings between approximately .15 and .40 are considered moderate. Because the SPOT indicators are binary (i.e., presence/absence), for the purpose of this review the absolute magnitude of a factor is more important than the direction of the loading (i.e., positive/negative).

- *Overlap with Section 2 (Observation and Behavior Analysis).* If applicable, documentation of overlap between Sections 2 and 4 of the SPOT Referral Report. Information provided includes the current indicator label (*Current SPOT Referral Report*) and the new indicator label (*Proposed Refined Indicator*) based on feedback provided during the first SME Panel meeting

Exhibit 3 presents a sample table of research evidence, similar to that included for each indicator in the Summary Document.

Exhibit 3. Sample Research Evidence Table

Research Evidence

Indicator Label				
Frequency of Occurrence				
Average Frequency of Occurrence Across Years	0.12%			
Trending				
Ranks				
Quartile Rank Across Years	3	Quartile Rank Information		
Rank by Hub Size - Small Hub	3	1 = top 25%		
Rank by Hub Size - Medium Hub	3	2 = interquartile (middle 50%)		
Rank by Hub Size - Large Hub	3	3 = bottom 25%		
Item-level Predictive Utility				
	Odds Ratio			
	Lower Bound	Upper Bound	Sig.	Notes
To Serious Prohibited or Illegal Items	3.95	8.35	<.001	
To Fraudulent Documents	6.39	14.25	<.001[a]	
To LEO Arrest	18.06	39.61	<.001[a]	
To Combined Outcome	7.12	13.27	<.001	
Factor Analysis				
	Factor Loadings			
	Subset 1	Subset 2	Best Fit	Notes
Scripted, but Terrified	0.29	0.26		
Strategically Verbally Avoidant	0.25	0.25		
Overlap with Section 2				
Current SPOT Referral Report				
Proposed Refined Indicator				

Process

In preparation for the SME Panel meeting, AIR developed a process to structure the two-day meeting and maximize productivity. Again, the goal was to foster rich discussion and gather members' input on the Section 4 indicators.[1]

Panel members were divided into two working groups. Each group had a mix of research and operations-oriented SMEs to encourage productive discussion where multiple viewpoints were considered. During the first day, the majority of the time was devoted to three rounds of collaborative breakout sessions: 90-minute blocks where each working group discussed a particular set of five to eight indicators and provided recommendations on whether to remove or retain each indicator. If the group decided to retain an indicator, members note whether changes should be made to any part(s) of the indicator itself (e.g., label, operational definition, description, exemplars).

To facilitate the group discussion, working groups were given instructions on how to systematically provide recommendations for their assigned indicators (see Exhibit 4 for the template). The process is described here:

- Step 1. Select one:
  - Remove
  - Retain as is
  - Retain with changes*
- *Step 1a. If selected *Retain with changes*, select all that apply:
  - Combine
  - Separate/split
  - Revise indicator name
- Step 2. Detail changes and indicate relative importance (optional) Select further changes that apply. If you have background knowledge or opinions on the importance or utility of a particular indicator in identifying someone who is trying to deceive, please indicate this here. If you do not have strong feelings about this, feel free to leave it blank.

  Detail Changes
  - Revise indicator definition
  - Revise accessible exemplar(s)
  - Revise non-accessible exemplar(s)

  Relative Importance
  - High
  - Medium
  - Low

[1] Ten Section 4 indicators overlapped with Section 2 indicators. The SME Panel members provided input on the 10 overlapping indicators during the first SME Panel meeting in November 2013.

Following each breakout session, all members reconvened to present an overview of their indicator set, explain decisions made, and bring up any issues or questions for discussion among the whole group. Discussion during both the breakout and plenary sessions were captured by AIR note takers for later analysis and to inform AIR's recommended changes to the Section 4 indicators. As mentioned previously, note takers completed a pre-developed grid for each indicator discussed, as seen in Exhibit 4.

Exhibit 4. Indicator-Specific Note-Taking Grid

#	INDICATOR LABEL		
Step 1. Select one		**X**	**Notes**
Remove			
Retain as is			
Retain with changes*			
***Step 1a. If selected *Retain with changes*, select all that apply and insert notes**			
Combine			
Separate/split			
Revise indicator name			
Step 2. Detail changes and indicate relative importance (OPTIONAL)			
Revise indicator definition			
Revise accessible exemplar			
Revise inaccessible exemplar			
Relative Importance			
Low			
Medium			
High			

Following the SME Panel meeting, AIR analyzed and processed the information presented and the conclusions drawn to develop a preliminary indicator list. This preliminary indicator list was presented to TSA threat assessment/behavior detection experts for review and comment. This feedback from the TSA experts was incorporated into the development of the proposed revised version of the revised indicator list.

RESULTS

As a result of the SME Panel meeting and subsequent analysis of feedback provided, the proposed list includes six indicators. Within these six, we have subsumed a number of current indicators that can be used as assessable examples. For example, a passenger exhibiting the new indicator, (b)(3):49 U.S.C. § 114(r) might be (b)(3):49 U.S.C. § 114(r) (DEC11) or provide (b)(3):49 U.S.C. § 114(r) (DEC20). In other words, there are multiple ways this particular indicator might look, and current indicators provide useful examples.[5]

Appendix B includes a crosswalk of the proposed new indicators and the current indicators from Section 4. Again, some of the current indicators have been collapsed while others remain standalone indicators that represent distinct constructs. Exhibit 5 lists the proposed Section 4 indicators below.

Exhibit 5. Proposed Section 4 Indicators

Indicator Label
(b)(3):49 U.S.C. § 114(r)

Based on feedback from the first SME Panel, AIR previously proposed revised Section 2 indicators, which are grouped into higher-order clusters (AIR Deliverable 2.2.1: Costigan, Taylor, Makonnen, Toplitz, & Baumann, 2013). Not all Section 4 indicators lent themselves to this type of organization, as they were distinct concepts. Five of the six new indicators (listed above in Exhibit 5) correspond either one-to-one with current Section 4 indicators or, in one case, two indicators are collapsed into a new, broader indicator. However, the majority of current Section 4 indicators hang together conceptually in an (b)(3):49 U.S.C. § 114(r) cluster.

More specifically, we created the (b)(3):49 U.S.C. § 114(r) cluster because there is similarity and, to some extent, overlap among many of the Section 4 indicators and their corresponding assessable exemplars. To resolve this ambiguity, we identified eight current Section 4 indicators that fit within this cluster. Following an analysis of exemplars belonging to these eight indicators, we came up with six unique behaviors, listed below in Exhibit 6. We believe this new conceptualization of an (b)(3):49 U.S.C. § 114(r) cluster, as well as the identification of concrete, observable behaviors, is useful because BDOs will no longer have to infer passenger

[5] Work on revised operational definitions (descriptions, assessable and non-assessable examples, etc.) for the proposed indicators is ongoing and will be submitted as part of an upcoming deliverable.

intent (e.g., whether a passenger exhibited a behavior to intentionally delay answering or for a variety of other reasons). How this cluster will be used – whether the behaviors function as indicators themselves or serve as examples of one overarching indicator – must be determined in relation to changes in SPOT process optimization. However, we believe this new conceptualization will be beneficial regardless of what process changes are implemented.

Exhibit 6. Behaviors within (b)(3):49 U.S.C. § 114(r) Cluster

(b)(3):49 U.S.C. § 114(r)

It is important to note that certain Section 4 indicators are repeated in the SPOT Referral Report Section 2 (Observation and Behavior Analysis). For example, an element of the Section 2 indicator, (b)(3):49 U.S.C. § 114(r) is repeated in the current Section 4 indicator (b)(3):49 U.S.C. § [illegible]. During the current optimization effort, the primary focus was on Section 4, specifically indicators that were unique to the section. However, overlap across sections was acknowledged and will be given further consideration during the ongoing refinement process. A full review of all indicators in all sections will be completed during the next phase of optimization with the goal of having no overlap across sections of the Referral Report.

Removal from Referral Report Section 4

Of the Section 4 indicators reviewed during this meeting, the SME Panel recommended the removal of eight indicators: (b)(3):49 U.S.C. § [illegible] (DEC3); (b)(3):49 U.S.C. § 114(r) (DEC6); (b)(3):49 [illegible] (b)(3):49 [illegible] (DEC8); (b)(3):49 U.S.C. § 114(r) (DEC16); (b)(3):49 U.S.C. § 114(r) (b)(3):49 [illegible] (DEC18); (b)(3):49 U.S.C. § 114(r) (DEC19); (b)(3):49 U.S.C. § 114(r) (b)(3):49 U.S.C. § 114(r) (DEC24) (b)(3):49 U.S.C. § 114(r) (b)(3):49 [illegible] (DEC31). Exhibit 7 also summarizes these changes.

Exhibit 7. Indicators to Remove

DEC #	Original Indicator Label	Recommendation
3	(b)(3):49 U.S.C. § 114(r)	Remove - Difficult to assess
6		Remove - Difficult to assess
8		Remove - Difficult to assess
16		Remove - Difficult to assess
18		Remove - Difficult to assess
19		Remove - Difficult to assess
24		Remove - Covered in revised Section 2 Indicator
31		Remove - Covered in revised Section 2 Indicator

At this stage of the optimization effort, the team has focused on the indicator labels–aiming for clear, precise, and standardized wording. As part of the next phase of optimization, indicator operational definitions and exemplars will be finalized on the basis of the recommendations of the SME Panel meeting and TSA stakeholders.

SUMMARY AND NEXT STEPS

As described above, the goal of this task was to optimize the Section 4 indicators, using a structured and standardized methodology with input from the SME Panel and TSA/BDA program leadership. The results of the SME Panel meeting in February 2014 reduced the current set of Section 4 indicators to six indicators. Eight indicators were recommended for complete removal from the behavior detection process and ten others are currently captured in Section 2. In addition, discussions about optimization of other indicators, process optimization, and training development began during the SME Panel meeting. This information will be incorporated into ongoing discussions regarding continued refinement of the Referral Report and SPOT process.

The results presented above include the new set of proposed Section 4 indicator labels. Indicator labels were crafted to be clear, concise, precise, and standardized. In the next phase of the optimization work, each new indicator's operational definitions (i.e., descriptions and exemplars) will be further refined to ensure that all recommended SME Panel changes are captured in revised training materials. The resulting operational definitions will be precise and specific with the goal of achieving reliable coding by BDOs trained and proficient in the indicator set. By the end of Year 1 (March 2014), AIR anticipates that Section 4 indicator label wording will be finalized and the associated operational definitions and exemplars will be in draft form and usable for pilot testing.

Sharing Refined Indicators with Operational Staff

As indicated in earlier reports, it is important to note that because most of the new indicators in the refined set represent one or more of the original SPOT indicators (as shown in Appendix B), the operational definitions (i.e., descriptions and exemplars) will be substantially changed to develop more precision, clarification, and standardization for a revised Behavioral Reference Guide. To avoid confusion, we recommend that only the new indicator list be shared with BDOs, not the linkages to the old indicators. In addition, BDOs in the field should view this revised indicator set along with the revised Behavioral Reference Guide only when it is completed. If BDOs are given the new indicator list without the definitions, they will likely make assumptions about the meaning and use of the labels and possibly have concerns about the "missing" indicators (which, in fact, are really combined with other indicators). Thus, AIR strongly emphasizes the importance of training on the new indicator definitions and careful pilot testing and rollout of the revised procedures.

In addition, we recommend that BDOs have the opportunity to provide feedback on the new indicator set during the pilot test phase of the optimization work. BDOs should be allowed to anonymously provide positive and negative feedback about indicators, processes, and changes to referral patterns that may occur as a result of implementation of the new indicator set. TSA should additionally consider whether more formalized, although still confidential, feedback should be collected through interviews or focus groups.

Further Indicator and Process Optimization

In addition to the optimization of SPOT Referral Report Sections 2 and 4, it is anticipated that further behavior detection indicator and process optimization activities will occur by March 2014. The goal is to produce a fully refined behavior detection process that fits into evolving checkpoint configurations and procedures. To that end, further optimization activities will include review and refinement of indicators in SPOT Referral Report Section 5 (Possible Suicide Bomber Cluster). Process optimization will also be considered and include refinement related to Section 6 (Possible Surveillance Activity) and Section 7 (Auto LEO notification), as well as evaluating reweighting indicator values, changing decision thresholds, and determining which information should be included on the revised SPOT Referral Report. Using the same method and procedures for refinement, including SME Panel input, available operational data, and related threat assessment research findings, AIR will ensure that the result of this work will be a fully refined behavior detection process. Once accomplished, the refined process can be tested in the field and further optimized as new operational and test and evaluation data are collected.

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APPENDIX A:
SME PANEL MEMBER BIOS

Coral Dando Ph.D.
Awaiting biosketch.

Paul Ekman, Ph.D.
With more than 100 articles published, and several honorary doctoral degrees in addition to his own distinguished 50-year academic career, Dr. Paul Ekman, Professor Emeritus in Psychology at the University of California—San Francisco, is the researcher and author best known for furthering our understanding of human facial and gestural expression. A pre-eminent psychologist and codiscoverer of microexpressions with Friesen, Haggard, and Isaacs, Dr. Ekman was named one of the most influential psychologists in the 20th century by the American Psychological Association and one of the 100 most influential people in the world in 2009 by *TIME Magazine*.

Christian Meissner, Ph.D.
Dr. Christian Meissner is Professor of Psychology at Iowa State University. He holds a doctorate in cognitive and behavioral science from Florida State University (2001) and conducts empirical studies on the psychological processes underlying investigative interviews, including issues surrounding source/witness recall and identification, deception detection, and interrogations and confessions. He has published numerous peer-reviewed journal articles and book chapters, and his research has been funded by the National Science Foundation (NSF), the U.S. Department of Defense (DoD), the U.S. Department of Justice (DoJ), and the U.S. Department of Homeland Security (DHS). He has served on advisory panels for the NSF, the National Academy of Sciences, DoD, and DHS, and currently serves on the editorial board of several prominent academic journals. From 2010 to 2012, he served as Program Director of Law & Social Sciences at the NSF. In 2008, Dr. Meissner received the Saleem Shah Award for Early Career Excellence in Psychology and Law from the American Psychology-Law Society and the American Academy of Forensic Psychology. In 2011, Drs. Meissner and Lassiter were awarded the American Psychology-Law Society Book Award and the American Publisher's PROSE Award for Professional and Scholarly Excellence in Psychology for their edited volume, *Police Interrogations and False Confessions: Current Research, Practice, and Policy Recommendations*. Most recently, Dr. Meissner received the 2013 Academic Excellence Award from the International Investigative Interviewing Research Group.

John Monahan, Ph.D.
Awaiting biosketch.

Helene Mullaney, M.A.
Ms. Helene Mullaney, from Deloitte Consulting LLP, has over 24 years of professional experience conducting behavioral analyses in applied settings. Since 2000, her work has focused on identifying patterns of terrorist targeting and threat behaviors in support of security operations. She designed and led a multimethod, multidata collection effort to identify and validate predetonation suicide attack indicators, which included interviewing world-renowned subject matter and security experts. She has 4 years of experience conducting training needs analysis and training evaluation for intelligence community and DoD clients and currently

provides process improvement support to an intelligence agency.

Transportation Security Administration (TSA)

Jennifer King Blanchard, M.A.
Ms. Jennifer King Blanchard is the Behavior Detection and Analysis Lead within the Threat Assessment Capabilities Branch of the Office of Security Capabilities at the Transportation Security Administration (TSA). She joined TSA in 2009, first as the Training Manager and then as the Branch Chief for the Strategic and Technical Branch. Currently, her role centers on building a research foundation for behavior detection capabilities in the aviation environment. Prior to coming to the TSA, Ms. King worked at the U.S. Naval Research Laboratory (NRL) as an Engineering Research Psychologist in the Adversarial Modeling and Simulation Branch. While there, she worked closely with DHS's Science and Technology Directorate on various elements of Project Hostile Intent (PHI), including data collection, sensor evaluation, literature reviews, and the development of micro expression training and animation tools. She also served on the Behavior Representation in Modeling & Simulation conference committee for 4 years during her time at the NRL. She holds an M.A. in industrial organization psychology and a B.S. in criminal justice from East Carolina University.

Alvin Brooks
Awaiting biosketch.

John Carter
Mr. John Carter has been working for the Transportation Security Administration since 2002. He worked as a Screener, Lead Screener and Screening Supervisor until being laterally promoted to an Expert Behavior Detection Officer. While working as a screener Mr. Carter was trained and provided training to perform dual function screening operations. He co-developed an in-house mentoring system for mentors and newly trained TSO's. In the spring of 2005 John was selected to participate in the PASS program which is now SPOT. Mr. Carter was among the first selected and hired to be ETSO-BDO and BDO instructor. He was a member of the National Training team from October 2006 until February 2012. Mr. Carter currently works at Portland International Airport (PDX) and routinely provides support for Head Quarter initiatives.

Lori McCullough
Ms. Lori F. McCullough is a SPOT Transportation Security Manager at Salt Lake City International Airport (SLC). Previously, she served as a Supervisory Transportation Security Officer at SLC from February 2003 to April 2007. Before that she served as a Lead Transportation Security Officer at SLC. Ms. McCullough came to the TSA in September 2002. She served on the Surge Capacity Force in New York City from November to December 2012, supporting the efforts of the Federal Emergency Management Agency after Hurricane Sandy. Prior to joining TSA, Ms. McCullough served in retail and direct sales as branch/division manager.

Donnie Mancuso
Awaiting biosketch.

Sarah Moeller
Awaiting biosketch.

American Institutes for Research

Tracy Costigan, Ph.D.
Dr. Tracy Costigan, Principal Research Scientist at AIR, has nearly 20 years of experience in behavioral science research. Technical areas of focus include research design, quantitative methodology, predictive modeling, test development and validation, training evaluation, survey design, behavioral measurement, and large-scale data analysis. Research areas include workforce and national security issues, behavioral analysis, mental health, and education. Dr. Costigan served as Principal Investigator for PHI (2005–2011), which was jointly funded by the NRL and DHS's Science and Technology Directorate (DHS S&T). In this capacity, Dr. Costigan provided project direction for all tasks, interacting with clients and Government representatives. Related to the SPOT Program, Dr. Costigan developed the methodology for and led the implementation of the SPOT Validation Study as well as led the data analysis effort. She has briefed the study to the project's independent review panel as well as to the TSA, the DHS, and the U.S. Government Accountability Office. As Principal Investigator, she also led work on the Identification of Suicide Attack Indicators, a study that involved conducting semistructured interviews with subject matter experts (SMEs) and eyewitnesses to suicide attacks. Her PHI work also included developing complex statistical models of nonverbal indicators of deception; developing knowledge tests to evaluate BDOs in a supplemental training course; conducting literature reviews on suicide attack indicators, the casual conversation interview approach, and cross-cultural factors in deception detection; and developing standardized definitions of SPOT indicators to support training development. In 2011, Dr. Costigan was invited to serve on a SME Panel for TSA to discuss the design of microexpression training for Transportation Security Officers (TSOs). She recently published a book chapter on validation methods for security measures in *Evidence-Based Counterterrorism Policy* (2012), part of the Springer Series on Evidence-Based Crime Policy. Dr. Costigan holds a Ph.D. in

Zodie Makonnen, Ed.M.
Ms. Zodie Makonnen, Senior Research Analyst at AIR, has over 20 years of experience in program evaluation and research. Most recently, Ms. Makonnen served as Deputy Project Director for PHI and played a central role in the SPOT Validation Study and the Identification of Suicide Attack Indicators tasks. Responsibilities included developing and refining behavior-based measures of deception and hostile intent through the development of in-depth interview protocols for qualitative interviews with SMEs; conducting interviews and focus groups with a variety of respondents; and conducting extensive literature reviews on a range of issues related to deception and hostile intent. Currently, she serves as Project Director for a grant that involves the independent evaluation of a classroom-based teacher performance evaluation system. Specific project activities include developing evaluation designs and appropriate data collection

measures, including surveys and observation, interview, and focus group protocols. Ms. Makonnen holds an Ed.M. in education from Harvard University.

Tanya Taylor, Ph.D.
Dr. Tanya Taylor, Research Analyst at AIR, has over a decade of experience in the arena of legal psychology, including research related to interviewing techniques, interrogations, deception detection, false confessions, and judicial decision making. She has program evaluation and field and laboratory research experience and has had ample training in research design and methodology and advanced statistical procedures. Dr. Taylor led the PHI Deception Modeling team, engaging in fundamental research on deception detection using facial expression and body movement data and applying innovative statistical methodology. In addition, she was a senior staff member for the SPOT Validation Study, involved in data analysis, design, and implementation. Dr. Taylor holds a Ph.D. in human behavior and organizations, with an emphasis in legal psychology, from the University of Texas at El Paso.

Emily Baumann, M.S.
Ms. Emily Baumann, Research Associate at AIR, has been involved in DHS- and TSA-sponsored research since 2008. She has supported PHI in the past by assisting the behavioral analysis team with data preparation, conducting statistical analyses, coding and synthesizing qualitative data, conducting unclassified and classified literature reviews related to behavioral indicators of suicide attack, collecting data through site visits and monitoring other data collectors, and contributing to reports. Ms. Baumann has worked for the last several years on conducting strategic job analyses and supporting program evaluations and behavioral analyses. Additional research responsibilities have included organizing and conducting SME focus groups and interviews, collecting observation data, contributing to technical reports, and maintaining project budgets and monthly client reports. Ms. Baumann holds an M.S. in applied sociology from Clemson University.

Michele Toplitz, B.A.
Ms. Michele Toplitz, Research Associate at AIR, has been involved in DHS- and TSA-sponsored research since 2005. Most recently, she served as a member of the SPOT Validation Study team; her involvement included developing data collection procedures for BDOs, conducting airport monitoring visits, and analyzing results for the final report. Ms. Toplitz was also an integral part of the PHI Identification of Suicide Attack Indicators task. Participation included developing interview protocols and training guides and conducting literature reviews on behaviors of suicide attackers with respect to the SPOT indicators. As part of the BDO Selection System Development project, she administered pilot and field tests with BDOs at a number of U.S. airports. Certified in the Facial Action Coding System (FACS), Ms. Toplitz applied this expertise to coding experimental video data and in support of TSA's development of a supplemental training course for BDOs. Ms. Toplitz holds a B.A. in anthropology/sociology and Spanish from Lafayette College.

APPENDIX B: PROPOSED SECTION 4 INDICATORS MAPPED TO ORIGINAL INDICATORS

Exhibit B-1. Proposed Section 4 Indicators Mapped to Original Indicators

NEW Indicator Label	Original DEC#	Original Indicator Label
(b)(3) 49 U.S.C. § 114(r)		