A Review of the FBI's Progress in Responding to the Recommendations in the Office of the Inspector General Report on the Fingerprint Misidentification in the Brandon Mayfield Case

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TABLE OF CONTENTS

CHAPTER ONE
BACKGROUND

I. Introduction

In March 2004, the Federal Bureau of Investigation (FBI) Laboratory identified Brandon Mayfield, an Oregon attorney, as the source of a latent fingerprint recovered from a plastic bag containing explosive detonators found near the site of commuter train bombings in Madrid, Spain that killed almost 200 people and injured more than 1,400 others. Based primarily on the FBI Laboratory's conclusion, the FBI arrested Mayfield as a material witness in May 2004. Approximately 2 weeks after Mayfield's arrest, the Spanish National Police (SNP) informed the FBI that it had identified an Algerian national, Ouhnane Daoud, as the source of the latent fingerprint. The FBI subsequently examined Daoud's fingerprints and withdrew its identification of Mayfield, and Mayfield was released from custody after being held for 14 days. The FBI issued a formal apology to Mayfield and his family.

After news of the misidentification became public, the Department of Justice (DOJ) Office of the Inspector General (OIG) initiated a review to determine the causes of the error, assess the FBI Laboratory's conduct, evaluate its responses to the error, and make additional recommendations for changes in FBI Laboratory procedures to prevent future errors. The OIG's report, *A Review of the FBI's Handling of the Brandon Mayfield Case*, was issued in early 2006.[1]

The OIG's review examined in detail the methodology used by the FBI Laboratory to conduct latent fingerprint examinations, the Standard Operating Procedures (SOPs) in place at the time of the misidentification, and the sequence of events that led FBI Laboratory latent print examiners to identify Mayfield incorrectly as the source of the Madrid latent fingerprint. The scope of our review focused on ascertaining the causes of the Mayfield error and recommending practical steps to improve the reliability of latent fingerprint examinations and reduce the likelihood of future errors. We concluded that the latent print examiners involved in the misidentification did not engage in

[1] We produced both a classified and an unclassified version of the report. A version classified at the Secret level was provided to the FBI and to the Department on January 5, 2006, and to the Chairman and Ranking Member of several congressional committees on January 6, 2006. We also publicly released on January 6, 2006, a 20-page unclassified executive summary highlighting the investigation's primary findings. After further work with the FBI and the Department to either declassify or redact as much of the information in the classified version of the report as possible, we publicly released a redacted, unclassified version on March 10, 2006.

intentional misconduct or violate any explicit FBI Laboratory procedures, but rather made errors in their application of the latent fingerprint methodology that reflected systemic problems with the FBI Laboratory's operations.

Based on our findings, our report made 18 recommendations to improve the FBI Laboratory's latent print operations and help prevent future misidentifications. The recommendations fell into six general categories: (1) conducting research to strengthen the scientific basis and develop objective criteria for identifying the source of a latent fingerprint; (2) revising the SOPs to provide more specific standards for conducting latent fingerprint examinations; (3) improving documentation of latent print examinations; (4) implementing verification and blind verification procedures to guard against bias; (5) reviewing certain previous cases to ensure similar errors had not occurred; and (6) creating a written record of explanations for errors. These recommendations are described in more detail in Chapter Two of this report.

II. Summary of the OIG Follow-Up Review

Since issuance of our original report, the OIG has received several updates from the FBI Laboratory regarding its progress in implementing our recommendations. The Laboratory provided information to the OIG in March 2006; January 2008; and January, August, and November 2010. The FBI Laboratory's updates summarized the status of its efforts and provided updated copies of relevant Operating and Quality Assurance Manuals, SOPs, research findings, and training materials.

In this follow-up review, we assessed the FBI Laboratory's progress in implementing the 18 recommendations we made to help improve its latent fingerprint methodology and minimize the chances of future errors. We met with representatives from the FBI Laboratory and requested information to supplement and update earlier information concerning research projects in progress and recent revisions to the Laboratory's SOPs, manuals, and training materials. As part of the follow-up review, we conducted interviews with managers from the FBI Laboratory's Latent Print Operations Unit, Latent Print Support Unit, and Evidence Control Unit; latent fingerprint examiners; and representatives of the Department of Justice Criminal Division Capital Case Unit. We also examined research into the scientific foundations of latent fingerprint analysis being conducted by the National Institute of Standards and Technology (NIST), latent fingerprint experts, and researchers at various universities to address the concerns raised by the OIG and FBI reviews of the Mayfield misidentification, as well as court challenges to the admissibility of latent fingerprint evidence and a 2009 report by the National Academy of Sciences (NAS) critical of the forensic science disciplines.

The report is organized into two chapters. Chapter One provides background information on the FBI Laboratory's latent fingerprint methodology, an overview of the causes of the Mayfield error, and legal and scientific developments in the latent fingerprint discipline since the publication of our original Mayfield report in 2006. Chapter Two analyzes the FBI Laboratory's response to our recommendations and is organized in sections that correspond to the general categories of recommendations in the original Mayfield report. In Chapter Two we examine the FBI's progress in implementing the recommendations and describe what additional steps the FBI Laboratory has taken to address our concerns and what work remains before all of the recommendations can be closed.

In general, we found that the FBI Laboratory has made significant progress in implementing most of the recommendations we made in our original report, including undertaking research to develop objective criteria for latent fingerprint analysis and substantially revising its SOPs and training materials to address many of the causes of the Mayfield misidentification. In other areas, the FBI Laboratory has implemented procedures that differ from our recommendations, or has addressed them in its training materials rather than its SOPs, but nonetheless has fulfilled the intent of the recommendations. Several of the most significant recommendations, however, depend on the results of the FBI Laboratory's ongoing research projects and have not been implemented. Additionally, in several areas, the FBI Laboratory made changes to its procedures and training materials during the course of our review to address our remaining concerns.

III. Overview of Latent Fingerprint Identification and Methodology

In this section we provide background regarding the premises of latent fingerprint identification and the FBI Laboratory's latent fingerprint identification methodology. A more detailed discussion regarding these subjects appears in our original report. However, we have updated the discussion of FBI Laboratory procedures to reflect the current SOPs and practices, some of which were adopted after our original report in response to the Mayfield error.

A. The Premises of Latent Fingerprint Identification

A fingerprint is a reproduction of the pattern of friction ridge formations – that is, ridges on the skins of the fingers, palms, and feet that produce increased friction for gripping – on the surface of a finger. Friction ridges form during embryonic development in patterns caused by a combination of genetic and environmental influences. Fingerprints result from the deposition of oil or other substances upon contact between a surface and the friction ridges on a finger.

Latent fingerprint identification involves two categories of fingerprints: "known" or "exemplar" fingerprints and "latent" fingerprints. Known fingerprints are captured under controlled conditions by rolling the surface of the fingertip onto a fingerprint card or an electronic fingerprint capture device, or by pressing the fingers of each hand onto a card simultaneously, without rolling, to produce flat impressions. A full set of rolled fingerprints and flat impressions on a fingerprint card is known as a "ten-print" card.

By contrast, latent fingerprints are those left at the scene of a crime. Forensic laboratories use various physical and chemical processing techniques to enhance the visibility of latent fingerprints and to photograph them for analysis and comparison. The "clarity" of a latent fingerprint depends on how well the details from the three-dimensional friction ridges transfer from the finger and are reproduced in a two-dimensional image. Latent fingerprints frequently are distorted by factors such as downward pressure or lateral movement of the finger during deposition of the fingerprint, the shape or consistency of the surface upon which the fingerprint was deposited, or the type of substance deposited by the finger to make the fingerprint. As a result of these factors, latent fingerprints frequently are of lower clarity than known fingerprints and reproduce only a small fraction of the friction ridge detail in a full fingerprint.

Friction ridge patterns and fingerprints frequently are described in terms of three "levels of detail." Level 1 detail refers to ridge flow and includes patterns visible to the naked eye such as loops, whorls, and arches. Level 2 detail refers to characteristics that occur on individual ridge paths, including the turns that each ridge takes and the places where ridges end or split, known as ridge path deviations. Level 3 detail refers to extremely tiny variations in the ridges themselves, such as the shape of ridge edges, the width of the ridges, and the shape and relative location of pores along the ridges. Forensic examiners identify the source of a latent fingerprint by analyzing and comparing these three levels of detail to the known fingerprints of a particular candidate.[2] Level 2 ridge path deviations, also known as "points" or

[2] Since 1999, the FBI Laboratory has used its Integrated Automated Fingerprint Identification System (IAFIS) to search for fingerprints for comparison in cases lacking known subjects. IAFIS is a system for conducting computerized searches of FBI databases containing the known fingerprints of more than 67.2 million subjects in the criminal master file, including 73,000 known and suspected terrorists, and more than 26.3 million prints in the civil file, which contains prints taken in a non-criminal context, such as those from current and former federal employees and military personnel. To conduct an IAFIS search, examiners "encode" a digital image of the latent fingerprint by marking selected characteristics and then search the databases for similar fingerprints. IAFIS generates a list of 10 or 20 candidates whose known fingerprints score the highest according to a complex algorithm that measures the correspondence of points in the known prints with the encoded points. The examiner compares the candidate prints side-by-side with the latent fingerprint on the computer screen but may retrieve the original ten-print cards before reaching a final conclusion. The FBI

(Cont'd.)

"minutiae," long have been a major focus of latent fingerprint examination, and agreement in Level 2 details forms a primary basis for identifying the source of a latent fingerprint.

Latent fingerprint identification relies on the premises that friction ridges are unique and permanent. Some critics of latent fingerprint identification claim that these premises have not been scientifically proven.[3] A 2009 report by the NAS, however, concluded that "[s]ome scientific evidence supports the presumption that friction ridge patterns are unique to each person and persist unchanged throughout a lifetime."[4] Additional research to validate these concepts is ongoing.

B. The FBI Laboratory's Latent Fingerprint Methodology

The latent fingerprint discipline uses the "ACE-V" method for examining latent fingerprints. ACE-V is an acronym for the four steps of the method: Analysis, Comparison, Evaluation, and Verification. Unlike some forensic laboratories, the FBI Laboratory uses a "linear" approach to ACE-V, requiring examiners to complete and document their analysis of a latent fingerprint before viewing any known fingerprints or moving to the comparison and evaluation phases. The FBI Laboratory's increased focus on a linear approach was at least in part a response to the OIG's findings regarding the role of circular reasoning in the Mayfield error.[5]

The individual steps of the process used by the FBI Laboratory are described below.[6]

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recently unveiled an upgraded fingerprint identification system as part of its Next Generation Identification (NGI) System, a database that will integrate fingerprint search capabilities with other types of biometric identification upon completion. NGI will expand IAFIS search capabilities by using a different fingerprint identification algorithm and, when fully implemented, will produce faster, more accurate search results.

[3] *See*, *e.g.*, Simon A. Cole, "Forensics Without Uniqueness, Conclusions Without Individualization: The New Epistemology of Forensic Identification," *Law, Probability & Risk* 8, September 2009: 233, 236-247; Michael J. Saks and Jonathan J. Koehler, "The Individualization Fallacy in Forensic Science Evidence," *Vand. L. Rev.* 61, January 2008: 199, 210-214; Lyn Haber and Ralph Norman Haber, *Challenges to Fingerprints* (Tucson, Arizona: Lawyers & Judges Publishing Company, Inc., 2009), 21-26.

[4] Committee on Identifying the Needs of the Forensic Science Community, National Research Council of the National Academies, *Strengthening Forensic Science in the United States: A Path Forward* (The National Academies Press, 2009), 143-44 n.34-37 ("NAS Report").

[5] *See* U.S. Department of Justice Office of the Inspector General, *A Review of the FBI's Handling of the Brandon Mayfield Case* (March 2006), 138-150.

[6] The FBI Laboratory revised its SOPs for Examining Friction Ridge Impressions and Procedures for Blind Verification in April 2011, at the end of our follow-up review. The FBI (Cont'd.)

1. Analysis

During the analysis phase, examiners consider the three levels of detail in a fingerprint, determine its anatomical orientation, and assess potential sources of distortion that may affect its appearance. The objective of the analysis phase is to determine whether the latent fingerprint is "of value" – that is, whether the fingerprint has a sufficient quantity and quality of information to allow an examiner to reach a conclusion about its source. If the latent fingerprint is highly distorted or incomplete and lacks sufficient reliable detail to allow the examiner to reach a conclusion, the print is deemed of "no value."

The FBI Laboratory uses the standard "of value for identification," requiring an examiner to find enough reliable data to permit identification of a latent fingerprint (assuming access to known prints from the proper source) before proceeding to the comparison phase. The FBI Laboratory's "of value" standard differs from the suitability standard used by many other forensic laboratories, which require that a latent fingerprint be "of value for comparison" or "suitable for comparison" to move to subsequent phases of the ACE-V process.[7] According to the FBI Laboratory managers and examiners we interviewed, "of value for identification" requires examiners to have a higher degree of confidence in the reliability of the information they will use to form their conclusions before comparing the latent fingerprint to any known fingerprints.

Section 9.1 of the FBI Laboratory's SOPs for Examining Friction Ridge Impressions requires examiners to complete analysis of a latent fingerprint before looking at any known prints. In conducting analysis, FBI Laboratory examiners use the "ridges-in-sequence" technique, in which they go "ridge-by-ridge" and trace the friction ridges to observe their characteristics and spatial relationships. According to Michael Wieners, Chief of the FBI Laboratory's Latent Print Support Unit (LPSU), and Greg Soltis, Chief of the Latent Print Operations Unit (LPOU), using "ridges-in-sequence" produces more reliable conclusions because it enables examiners to detect indicators of abnormal distortion called "red flags" during the analysis phase and requires them to

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Laboratory stated that it may make additional minor changes to the SOPs before formally adopting them in late May 2011, but that the final document would not substantially differ from the version provided to the OIG. Where relevant, we have updated our discussion of the FBI Laboratory's procedures to reflect these revisions.

[7] *See*, *e.g.*, Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST), Revised Draft for Comment, Standards for Examining Friction Ridge Impressions and Resulting Conclusions, § 4.1.4.2, February 11, 2011 (describing two approaches to "of value"); Glenn Langenberg, "A Performance Study of the ACE-V Process: A Pilot Study to Measure the Accuracy, Precision, Reproducibility, Repeatability, and Biasability of Conclusions Resulting from the ACE-V Process," *Journal of Forensic Identification* 59, no. 2 (2009): 248 n.10 (same).

ascertain the spatial relationships between features in the latent fingerprint before being exposed to potential sources of bias from known fingerprints.[8]

2. Comparison

Section 9.2 of the SOPs for Examining Friction Ridge Impressions defines comparison as the side-by-side observation of friction ridge detail to determine whether the information in two prints is in agreement based upon features, sequences, and spatial relationships. The comparison phase begins after the examiner has analyzed and recorded observations for the latent fingerprint and has determined that it is "of value for identification." The examiner also analyzes the known prints in a similar manner before beginning side-by-side comparison.

The FBI Laboratory instructs examiners to conduct comparisons from poor quality to good quality prints, meaning that examiners generally look at the latent fingerprint first to prevent information from the known fingerprints from influencing their interpretation of the latent fingerprint. As with the analysis phase, examiners use "ridges-in-sequence" during the comparison phase, tracing the friction ridges to detect the ridge paths and features in both the latent and known fingerprints and then using a common starting point to compare the two fingerprints ridge-by-ridge. According to the FBI Laboratory, using the sequential observations produced by "ridges-in-sequence" during comparison is more reliable because adjacent ridges have a physical attachment to each other and move more or less in concert.

3. Evaluation

Under Section 9.3 of the SOPs for Examining Friction Ridge Impressions, evaluation is the formulation of a conclusion based upon an assessment of the agreement or disagreement of information observed during analysis and comparison. An FBI examiner may reach three possible conclusions: identification, exclusion, and inconclusive. In addition, in some cases the comparison may result in the examiner determining that latent print is "not of value for identification."

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[8] *See* Haber and Haber, *Challenges to Fingerprints*, 49 ("While no research evidence has demonstrated the reliability of examiners describing characteristics in order along a ridge, we would expect examiners to agree closely. This reliability still needs to be demonstrated."); David R. Ashbaugh and Max M. Houck, "Fingerprints and Admissibility: Friction Ridges and Science," *Canadian Journal of Police and Security Services* 3, no. 2, June 2005: 69 (recommending that examiners compare ridges in sequence to maximize cognitive judgment of ridge length and lateral spatial relationship); Lyn Haber and Ralph Norman Haber, "Experiential or Scientific Expertise?," *Law, Probability & Risk* 7, June 2008: 145 (noting that research is necessary to determine whether the "ridges in sequence" technique produces better examiner agreement on the occurrence of features in latent fingerprints).

a. Identification

Section 9.3.1 of the SOPs for Examining Friction Ridge Impressions states that identification occurs when there is sufficient friction ridge detail in agreement to conclude that two friction ridge prints originated from the same source, and when the examiner would not expect to see this amount of information in agreement from two prints that did not originate from the same source. The FBI Laboratory does not require a minimum number of corresponding features or minutiae to declare an identification. Instead, examiners consider whether the quantity and uniqueness of the information present in both prints is sufficient to conclude that they came from the same source. Examiners assess sufficiency based on the relationship between the quality of the latent fingerprint and the quantity of corresponding features present: the greater the clarity, the fewer features needed for sufficiency, and vice versa. In practice, this means that although no minimum number of corresponding features is required, the more features in agreement, the easier it is for an examiner to exceed his threshold of doubt and identify a latent fingerprint.

Historically, latent fingerprint examiners expressed identification conclusions in terms of "100% certainty," with a zero likelihood that the latent fingerprint was made by a different person. Although the FBI Laboratory has not lowered the standard required to make an identification, examiners no longer testify that they are "100% certain." Instead, examiners testify that they are confident in the conclusion, would not expect to see the same amount of information repeated if the fingerprints originated from different people, and find no physical evidence causing them to doubt that the fingerprints are from the same source.

The latent fingerprint discipline also historically considered conclusions of "[p]robable, possible, or likely individualization (identification)" to be "outside the acceptable limits of friction ridge identification science."[9] Examiners offering probabilistic conclusions faced possible review by the International Association for Identification (IAI), a forensic science association that certifies latent fingerprint examiners.[10] In July 2010, however, the IAI rescinded the ban on reporting possible, probable, or likely conclusions and allowed the use of mathematically based models accepted as valid by the relevant scientific

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[9] SWGFAST Friction Ridge Examination Methodology for Latent Print Examiners § 3.3.3 (2002).

[10] IAI Resolution 1980-5 (latent print examiner offering testimony of a possible, probable, or likely match without stating that the latent fingerprint could have originated from another source "shall be deemed to be engaged in conduct unbecoming such member"); IAI Resolution 1979-7 ("[The] conduct and status [of an IAI-certified latent print examiner offering probabilistic testimony] shall be reconsidered by the Latent Print Certification Board.").

community "to assess the associative value of the evidence."[11] Research into the use of statistical models to calculate fingerprint probabilities is ongoing, but no models have been validated for use in casework.

b. Exclusion

Section 9.3.2 of the SOPs for Examining Friction Ridge Impressions states that exclusion occurs when an examiner determines that latent and known fingerprints are not in agreement, and the examiner concludes that the friction ridges originated from different sources. Unlike an identification, examiners may exclude the source of a fingerprint based solely on Level 1 detail, such as when the latent fingerprint is clearly a whorl pattern and the known fingerprint is clearly an arch.

A discrepancy is a difference in friction ridge arrangements that indicates a latent and a known fingerprint were made by two different sources. A dissimilarity between the latent and known fingerprints resulting from distortion or other factors of deposition, however, is not a discrepancy and is not a basis for exclusion. As a result, one critical task for the examiner during evaluation is to determine whether differences in appearance between the prints are discrepancies (potentially requiring exclusion) or dissimilarities caused by distortion (potentially allowing identification). Physical evidence of distortion is the key to discerning between dissimilarities and discrepancies. Under newly adopted SOPs, an FBI examiner must have objective physical evidence to support any "explanation for differences" that he wishes to rely on in support of an identification. For example, an examiner who believes that differences he sees between a latent print and an exemplar were caused by a double tap must find objective indications of lateral or deposition pressure and movement observed during analysis, such as crossovers, misaligned ridges, extra thick ridges, and protruding ridge ends, to support that explanation. Moreover, new SOPs make it explicit that the examiner's level of confidence in each explanation for differences must be consistent with the degree of confidence required in order to render an identification decision.

Under prior versions of the SOPs, the presence of one discrepancy between the latent and known fingerprints was sufficient to exclude a source. The FBI Laboratory recently revised its SOPs for Examining Friction Ridge Impressions to state that exclusion occurs where "there are sufficient friction ridge details in disagreement to conclude that two friction ridge prints did not originate from the same source." The "sufficiency" standard for exclusions thus now mirrors the sufficiency standard for identifications. Unit Chief Soltis told us that this change brings the SOPs into closer alignment with current practice, and that examiners rarely see one discrepancy in isolation. Moreover,

[11] IAI Resolution 2010-18.

the one discrepancy rule was the subject of significant criticism within the discipline.[12] By its literal application, the one discrepancy rule would require a finding of "exclusion" in any case in which the examiner is uncertain whether a difference in appearance is a discrepancy or whether there is an explanation for the difference, such as lateral pressure or a double touch. Application of the one-discrepancy rule could potentially lead to erroneous exclusions.

In some cases involving complex latent fingerprints, it may be impossible for an examiner to either identify a latent fingerprint to a particular individual or to exclude that individual as the source of the print. The examiner may find one or more differences between the prints and be unable to state with adequate confidence that they are distortions (consistent with identification) or discrepancies (consistent with exclusion). According to Unit Chief Soltis, in this hypothetical scenario the examiner may determine, after the comparison phase, that the information in the latent print is not reliable, and thus the latent print is "not of value for identification," in effect reversing the determination made during the analysis phase that the latent print was "of value." According to Soltis, in such a case the latent fingerprint would not be discarded but would be retained in case files.

c. Inconclusive

The third permissible conclusion under Section 9.3.3 of the SOPs for Examining Friction Ridge Impressions is "inconclusive," used when "a qualified examiner is unable to identify or exclude the source of a print because the corresponding areas of friction ridge detail are absent or unreliable." This conclusion is available if the corresponding areas of friction ridge detail are not captured or are distorted in the available known prints.

An important but subtle relationship exists between the "inconclusive" conclusion and the "of value for identification" standard used by FBI examiners during the analysis phase. As discussed above, the FBI Laboratory uses "of value for identification" rather than "suitable for comparison" as the benchmark for determining whether a latent fingerprint contains sufficiently reliable information to proceed to the comparison phase. According to John Vanderkolk, an OIG consultant in the original Mayfield matter, determining that a latent fingerprint was "of value for identification" during the analysis

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[12] *See*, *e.g.*, John I. Thornton, "The One-Dissimilarity Doctrine in Fingerprint Identification," *Int'l Crim. Police Rev.* 306 (1977): 89, 93-94 ("Let us acknowledge that the one-dissimilarity doctrine has never been demonstrated to have originated from a firm scientific basis. Once we recognize this, we will not be forced to guess the manner of occurrence of unexplained differences. In view of a preponderance of matching characteristics, one dissimilarity isn't important. What is important is that the doctrine has diverted our attention from a more fundamental question: Given one or two unexplained dissimilarities, then how many matching characteristics are needed to achieve an identification?").

phase historically caused many examiners to be reluctant to use the "inconclusive" conclusion during the evaluation phase; instead, if an examiner was unable to identify or exclude a latent fingerprint that he had previously determined was "of value for identification," he would revert to the analysis phase and declare the fingerprint to be of "no value."[13] To address this concern, some forensic laboratories adopted "suitable for comparison" as the standard for proceeding past the analysis phase, permitting broader use of "inconclusive." Some forensic laboratories using "suitable for comparison," for example, have expanded the use of "inconclusive" to effectively permit qualified conclusions, such as "inconclusive, but with corresponding features noted."

Glenn Langenberg, a Certified Latent Print Examiner with the Minnesota Bureau of Criminal Apprehension, has explained this relationship between suitability determinations during the analysis phase and the use of "inconclusive" in the evaluation phase as follows:

> It has been the author's experience through both instructing students from various laboratories and from discussions at SWGFAST [Scientific Working Group on Friction Ridge Analysis, Study and Technology], that some agencies interpret inconclusive quite differently. Our agency has taken the position that the mark has some evidential value, but ultimately may not be identifiable. Under such circumstances, were the analyst to have the best known exemplars possible, but still could not effect the identification because there was insufficient quantity, quality, or specificity of feature in the mark, then the analyst would report inconclusive. At other agencies, under these circumstances, this mark would be re-evaluated and assessed as no value. In other words, if you cannot identify the impression, and additional exemplars will not help, then it is no value. The term value here clearly implies value for identification purposes. Under this interpretation, analysts would only use the term inconclusive when they cannot reach an opinion due to the quality of the exemplars or lack complete exemplars.[14]

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[13] John Vanderkolk is the Regional Laboratory Manager for the Indiana State Police. He is a member of SWGFAST, the scientific working group that sets guidelines and standards for latent fingerprint examination, and the Chair of the Forensic Identification Standards Committee of the IAI.

[14] Langenberg, "Performance Study of the ACE-V Process," 248 n.10. The draft SWGFAST standards similarly describe this relationship, stating that, where a latent fingerprint is "of value for identification," an inconclusive conclusion "occurs when an examiner is unable to individualize or exclude due to an absence of complete and legible known prints (e.g., poor quality fingerprints and lack of comparable areas)" and "means that the impression needs to be reexamined using clearly and completely recorded known impressions." SWGFAST, Revised Draft for Comment, Standards for Examining Friction Ridge Impressions and Resulting Conclusions § 4.3.2.3.1.

The FBI Laboratory's "of value for identification" standard similarly affects its use of "inconclusive." Unit Chiefs Soltis and Wieners initially told us that the FBI Laboratory does not limit examiners' use of "inconclusive" to situations where there are technical problems with or distortions in the known fingerprints. For example, both said that "inconclusive" could be available where an examiner sees one or more differences between two fingerprints but is not certain of the explanations for those differences, sees many similarities between the prints, and does not want to throw away the latent fingerprint by saying it is of "no value." After further discussion within the Latent Print Units, however, Unit Chiefs Soltis and Wieners clarified that this use of "inconclusive" would be inconsistent with its requirement that latent fingerprints be "of value for identification." Under that standard, an examiner could use "inconclusive" where there are similarities between known and latent fingerprints, but the *known* prints do not contain reliable corresponding areas for comparison. By contrast, if the *latent* fingerprint does not contain sufficient reliable details to permit an examiner to make an identification, even if given a reliable corresponding exemplar from the correct source, he must return to the analysis phase (with appropriate documentation) and determine that the latent fingerprint is of "not of value for identification."

The FBI Laboratory's use of the "inconclusive" determination is discussed in more detail in Chapter Two.

4. Verification

Under Section 9.4 of the SOPs for Examining Friction Ridge Impressions, verification is the "independent application of ACE to friction ridge prints by another qualified examiner." The FBI Laboratory requires verification of all identifications by a second examiner, while verification of exclusions or inconclusive determinations is optional. In a standard verification, the verifying examiner is selected by a supervisor and is given the original examination documentation, plus unmarked photos of the latent and known fingerprints. The verifying examiner thus knows the conclusion reached by the original examiner and which finger to look at in the known fingerprints when beginning his analysis.

Subsequent to the Mayfield error and the OIG's report, the FBI Laboratory adopted requirements to conduct "blind verifications" for certain examinations. Under Section 9.5 of the SOPs for Examining Friction Ridge Impressions, blind verification is "independent application of ACE to a friction ridge print by another qualified examiner, who does not know the conclusion of the primary examiner." As discussed in more detail in Chapter Two, the FBI Laboratory uses blind verification in cases presenting the greatest risk of error, such as where a single latent fingerprint is identified, excluded, or deemed inconclusive.

Where a verifier or blind verifier disagrees with the original examiner's conclusion, the examiners are considered to be "in conflict." The FBI Laboratory's current Conflict Resolution Procedures require the original and verifying examiners to discuss the disagreement and "attempt to resolve the matter to the agreement of all parties." If the examiners are unable to resolve their disagreement, the matter goes to the Unit Chief for resolution. According to Unit Chief Soltis, if disagreements reach his level, he requires the conflicting examiners to do a detailed ridge-by-ridge analysis to capture the cognitive process used to reach their conclusions, and then to "trade papers" and study what the other has done. If the examiners still are unable to agree, the Unit Chief, the conflicting examiners, and a technically qualified third party attempt to resolve the conflict. The third-party examiner reviews a copy of the materials created by the original and verifying examiners, and then meets with the examiners and the Unit Chief to discuss the examinations and try to reach common ground, with the Unit Chief serving as the mediator. If the examiners remain unable to settle their differences, the disagreement goes to the Section Chief for resolution, and ultimately to the managing Deputy Assistant Director (DAD), who requests that the Chief of the Quality Assurance and Training Unit convene a Scientific Resolution Board (SRB) to resolve conflicts that cannot be resolved at the Section Chief level, or to resolve issues or concerns that have widespread or substantial impact on the FBI Laboratory. The Assistant Director (AD) must approve or reject any recommendations made by an SRB and direct other actions needed to resolve the conflict.

5. Documentation of ACE-V

Section 12 of the SOPs for Examining Friction Ridge Impressions requires examiners to create sufficient documentation, including annotated photographs and case notes, to allow another examiner to evaluate the examination and replicate any conclusions. The SOPs include specific documentation requirements for each phase of the ACE-V process. The current documentation requirements were significantly expanded following the Mayfield error and the OIG report.[15] These requirements are discussed in more detail in Chapter Two in connection with the relevant recommendations.

[15] SWGFAST, which establishes latent fingerprint guidelines and standards, also has substantially revised its documentation requirements since the Mayfield error. *See* SWGFAST, Standards for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V), February 12, 2010.

6. Reports of Conclusions

The FBI Laboratory communicates the final results of latent print examinations to the contributor in a Report of Examination. This report includes a section containing the results, opinions, interpretations, and conclusions of examinations conducted by a particular examiner, in addition to case information and descriptions of the evidence received and examined. The report provided to the contributor contains no information about disputed verifications or blind verifications that are resolved through the FBI Laboratory's conflict resolution process, but newly adopted SOPs require such information to be documented in the case file.

Before the report is issued to the contributor, a senior forensic examiner conducts and documents a technical review of the conclusions and supporting documentation to ensure that the examiner has performed the appropriate examinations; that the conclusions are consistent with the documented data, supported by the documentation, and within the limits of the latent print discipline; and that verifications and blind verifications have occurred and been properly documented where required. The report and supporting documentation are then administratively reviewed to ensure that information from the case notes regarding the FBI Laboratory's ultimate conclusions has been adequately transferred to the final report.

7. Errors

The latent print discipline historically has divided errors into "methodological" and "human" errors, asserting that the ACE-V methodology has a zero error rate, and that any errors are attributable to improper application of the methodology by the examiner.[16] The FBI Laboratory has recently clarified this position, stating that the ACE-V methodology has no calculable error rate because it has no inherent error, but ACE-V cannot be applied without an examiner.[17] Research is ongoing to develop a valid measure of examiner error, but no consensus currently exists about whether to derive individual error rates for each examiner based on proficiency test results or error histories, or to define error rates more broadly based on laboratory audits or the latent print discipline as a whole.

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[16] *See, e.g.*, *United States* v. *Llera Plaza*, Fed. R. Evid. 983 (E.D. Pa. 2002) (testimony regarding distinction between methodological and human error), *vacated and withdrawn*, 188 F. Supp. 2d 549 (E.D. Pa. 2002).

[17] Peter E. Peterson, et al., "Latent Prints: A Perspective on the State of the Science," *Forensic Science Communications* 11, no. 4 (2009), http://www2.fbi.gov/hq/lab/fsc/backissu/oct2009/review/2009_10_review01.htm (accessed July 21, 2010).

The FBI Laboratory considers erroneous identifications and exclusions to be "analytical/interpretative errors" – that is, errors in the examination process that produce an incorrect conclusion. FBI Laboratory procedures include specific steps to address these types of errors. The person identifying an error must notify his Unit Chief, who is required to have the examination documentation reviewed by an examiner other than the original reviewer or a technical reviewer to confirm that an error did occur. If the review concludes that the original examination was in error, the Unit Chief must notify the Chief of the Quality Assurance and Training Unit to initiate corrective or follow-up action.

For major errors having a fundamental impact on the quality of the Laboratory's work product, the FBI Laboratory initiates a corrective action and assigns an employee to investigate the "root cause" of the error and determine the actions necessary to remediate, correct, and prevent recurrence of it. The FBI Laboratory also may initiate a corrective action for repeated minor errors. Appropriate corrective actions may include notifying the contributor of the error, issuing amended or supplemental reports, conducting casework reviews, requiring remedial training or supplemental proficiency tests, or requiring supplemental review of work before releasing the report. The FBI Laboratory requires documentation of all corrective actions, including a written summary of the "root cause" of the error.

According to the FBI Laboratory, it has not issued a report containing known errors by latent fingerprint examiners (including erroneous identifications and exclusions) since the Mayfield error was discovered in 2004.

C. Cluster Prints

Latent fingerprints sometimes appear in a relationship to one another that permits the examiner to infer that the prints were deposited simultaneously by different fingers on the same hand. These simultaneous impressions, or "cluster prints," have two primary uses in latent print identification: allowing an examiner to determine the correct finger for an IAFIS search or a comparison to a ten-print card and, in some forensic laboratories, permitting identifications where the detail in each latent fingerprint is insufficient to stand alone, but the cumulative detail in the prints in agreement with the known fingerprints is sufficient to identify the source.

The FBI Laboratory does not perform cluster identifications based on the accumulative weight of the data in the prints, and it thus requires that one latent fingerprint in the cluster provide sufficient detail to identify the source. According to Unit Chief Wieners, current research has not provided a scientific basis for performing cluster identifications where no one print contains sufficient detail to identify, although studies to validate the technique are ongoing. As a result, the FBI does not perform cluster identifications unless

the contributor sees probative value in determining that the prints are from side-by-side consecutive fingers and specifically requests that the FBI perform this analysis.

IV. Overview of the Mayfield Error and the FBI's Responses

A. The OIG's Conclusions Regarding the Causes of the Mayfield Misidentification

After the Madrid error came to light in May 2004, the OIG initiated a review to determine the causes of the error, assess the FBI Laboratory's conduct, evaluate its responses to the error, and make additional recommendations for changes in Laboratory procedures to prevent future errors. The OIG's review concluded that the primary causes of the misidentification were the following:

- Unusual similarity between certain friction ridge details on one of Daoud's known fingerprints and one of Mayfield's known fingerprints.
- Bias or "circular reasoning" caused by the original examiner's use of features he observed in Mayfield's known fingerprint to change his original analysis of the Madrid latent fingerprint.
- Reliance on Level 3 detail to identify Mayfield without taking into account concerns about the quality of the latent fingerprint or differences in Level 3 detail in other areas of the prints, and without checking all copies of Mayfield's known fingerprints to confirm that corresponding Level 3 features were reliably reproduced.
- Reliance on inadequate explanations for differences between the Mayfield known and Madrid latent fingerprints.
- Failure to consider the poor quality of the apparent similarities in Level 2 detail between the Mayfield known and Madrid latent fingerprints.
- Failure to reexamine the identification of Mayfield after the SNP informed the FBI that the Mayfield print was not a match in April 2004.

The OIG determined that other factors, including a lack of objective criteria for declaring an identification, potential bias in the verification process, and the pressure to declare an identification inherent in a high-profile terrorism case, did not clearly contribute to the Mayfield misidentification but nonetheless

created sufficient potential for future errors to warrant recommendations for changes to Laboratory procedures.[18]

B. The FBI Laboratory's Responses to the Mayfield Misidentification

After the misidentification, the FBI began significant corrective measures, including convening a panel of latent print experts to review the case file and evaluate its handling of the Mayfield matter, forming a committee to review the scientific basis for latent print identification and recommend research projects, and assembling "latent review" teams to evaluate the FBI's latent fingerprint procedures and operations. The latent review teams produced recommendations addressing 41 separate issues, the most significant of which the OIG considered and incorporated in its 2006 review.

In addition to the recommendations incorporated into the OIG's review, which are discussed in the next chapter, the latent review teams proposed major changes to the training of latent print examiners, including providing comprehensive training on friction ridge theory and application of the ACE-V methodology. In response, the FBI Laboratory made substantial revisions to its training of latent print examiners, producing a training program that differs significantly from the one in place before the Mayfield error. According to examiners familiar with the training used before the Mayfield error, new examiners received 6 months of intensive classroom training, but the ACE-V component of that training lasted about 4 hours and did not include information about the theory and science underlying the ACE-V methodology. By contrast, the ACE-V training now provided to new examiners takes up 6 weeks of the 6-month classroom curriculum. It includes lectures about each phase of the ACE-V process, as well as topics such as friction ridge biology and embryology and comparative biology to give examiners an understanding of how skin develops and how it can and cannot move. Concepts taught during lectures are then reinforced through practical applications of the theories, such as exercises that allow examiners to observe the pliability of skin and study how distortion occurs. After completing 6 months of classroom training and a comprehensive written test, examiners begin doing comparison exercises and receive 1 year of on-the-job training under the supervision of mentors.

C. Latent Fingerprint Research

After the Mayfield error, the FBI Laboratory planned four major research projects aimed at developing qualitative and quantitative standards for determining sufficiency (whether a latent fingerprint contains a sufficient

[18] Please see OIG, *The FBI's Handling of the Brandon Mayfield Case*, 127-194, for a full discussion of the causes of the Mayfield error.

amount of information that only one source is capable of producing it), demonstrating that friction ridge details are permanent and reproducible, and testing and comparing examiner accuracy. As explained below, the FBI Laboratory has completed or made substantial progress on the studies assessing quality, permanence, and accuracy, and it recently received funding for the study aimed at developing quantitative standards for the sufficiency of conclusions as part of an umbrella contract with Noblis, Inc.[19]

- The Quality Metric study sought to develop an objective measure of latent fingerprint quality and is substantially complete. Approximately 86 experienced examiners each assessed the quality of a selected subset of 1,090 latent and corresponding known fingerprint images. A contractor then developed a software program that used the collective assessments of the examiners to create an algorithm for scoring the quality of other latent fingerprints. The FBI Laboratory contemplates that once this program is validated for case work, it will provide examiners with a quantitative tool for assessing the quality of latent fingerprints.
- The Permanence Study has tracked the permanence and reproducibility of friction ridge details in two phases, the first of which is complete. Phase I analyzed the persistence of friction ridge detail on the finger and in friction ridge impressions over a period of 6 months, concluding that the three levels of detail are persistent on the skin, but the appearance of Level 3 detail is not consistently reproduced in different friction ridge impressions, even between impressions captured on the same day. Phase II, which is ongoing, will study whether friction ridge detail is permanent over a period of 10 or more years.
- The "Black Box Examiner" study, which is complete, measured the accuracy and consensus of latent print examiner decisions, finding an accuracy rate of 99.8% for identifications and 85% for exclusions. The FBI Laboratory has emphasized that (1) this study evaluated examiners on key decision points in the fingerprint examination process, not the process in its entirety; (2) the fingerprints included in the study were selected to include a range of attributes and quality encountered in forensic casework, and to be comparable to searches of an automated fingerprint identification system (AFIS) containing more than 58 million subjects; and (3) independent verification of the same comparisons by different participants (analogous to blind verification)

[19] Noblis, Inc. is a nonprofit corporation that provides scientific, engineering, strategic, and technology research and consulting to government and other clients.

detected all false positive errors and the majority of false negative errors in the study.

- The Quantity Metric, or "White Box Examiner," study will assess how the quantity and quality of corresponding features relate to identification, exclusion, and inconclusive determinations made by examiners, with the goal of developing a quantitative metric for the sufficiency of conclusions and creating software capable of measuring sufficiency for use by examiners.

In addition to the FBI Laboratory's research, other organizations are conducting studies to measure examiner performance, determine quantitative standards for sufficiency, establish a scientific method to quantify the accuracy and error rates of latent fingerprint examination, and develop standardized probability measures. In 2009, for example, the National Institute of Justice (NIJ) awarded approximately $2.9 million in grants to researchers conducting studies in these areas. Additionally, the National Institute of Standards and Technology (NIST) has initiated research to develop latent fingerprint identification technologies. Together, the NIJ and NIST have convened the Expert Working Group on Human Factors in Latent Print Analysis. The purpose of this group, which consists of latent fingerprint experts, statisticians, psychologists, researchers, and other scientific and legal experts, is to conduct a scientific assessment of the effects of human factors on latent fingerprint analysis and to recommend strategies to prevent errors. According to the FBI Laboratory's response, representatives from the FBI Latent Print Units are involved in this project, and they anticipate that the group will issue a report in December 2011.

V. Challenges to the Latent Fingerprint Discipline

Even before the Mayfield error, the latent fingerprint discipline faced challenges to the validity of its underlying science. In 1993, the Supreme Court developed the *Daubert* test, requiring trial judges to serve as gatekeepers for expert testimony regarding scientific, technical, or other specialized knowledge.[20] As a result of the increased scrutiny of scientific and technical expert testimony, criminal defendants began to argue that latent fingerprint identification is not supported by scientific research, is not governed by objective standards, and is thus insufficiently reliable to be admitted under *Daubert*.[21] Although courts have, almost without exception, upheld the

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[20] *See Daubert* v. *Merrell Dow Pharm., Inc.*, 509 U.S. 579, 591-95 (1993); *see also Kumho Tire Co.* v. *Carmichael*, 526 U.S. 137, 147 (1999) (extending *Daubert* analysis to all expert testimony).

[21] *See, e.g.*, Memorandum of Law in Support of Defense Motion to Exclude Government's Fingerprint Identification Evidence, *United States* v. *Mitchell*, No. 96-407 (filed (Cont'd.)

admissibility of latent fingerprint evidence in response to *Daubert* challenges, the Mayfield error provided new support for defense challenges to claims that latent fingerprint identification is "100% certain" and that the ACE-V methodology has a zero percent error rate.[22]

A 2009 report by the National Academy of Sciences (NAS) highlighted many of these same issues.[23] In this report, the NAS identified fundamental problems with various forensic science disciplines, such as a lack of research to validate basic premises and techniques. The NAS concluded that nuclear DNA testing is the only forensic method "rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source." Regarding latent fingerprint analysis, the NAS panel stressed the lack of documentation and the purported divide between methodological and human error as two of its major concerns. More fundamentally, the report observed that the ACE-V methodology does not guard against bias or produce repeatable or reliable results. The report stated that ACE-V is not specific enough to qualify as a scientifically validated method for friction ridge analysis, noting the lack of

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Oct. 27, 1998); *see generally* Paul C. Giannelli, "Scientific Evidence in Criminal Prosecutions," *Brooklyn L. Rev.* 75, Summer 2010: 1137, 1140-1145 (discussing history of challenges to forensic evidence under *Daubert*).

[22] Every circuit that has considered the admissibility of latent fingerprint evidence has held that it is reliable. *See United States* v. *John*, 597 F.3d 263, 274-75 (5th Cir. 2010) (latent print evidence is sufficiently reliable to be admitted in most cases without a *Daubert* hearing); *United States* v. *Havvard*, 260 F.3d 597, 601 (7th Cir. 2001) (fingerprint analysis is generally accepted, has a low rate of error, and can be objectively tested); *see also United States* v. *Baines*, 573 F.3d 979, 989-92 (10th Cir. 2009); *United States* v. *Spotted Elk*, 548 F.3d 641, 663 (8th Cir. 2008); *United States* v. *Vargas*, 471 F.3d 255, 265-66 (1st Cir. 2006); *United States* v. *Abreu*, 406 F.3d 1304, 1307 (11th Cir. 2005); *United States* v. *Mitchell*, 365 F.3d 215, 246 (3d Cir. 2004); *United States* v. *Crisp*, 324 F.3d 261, 268 (4th Cir. 2003). In at least two federal district court cases, however, courts have limited or excluded testimony about latent fingerprint identification based in part on the Mayfield error. *See United States* v. *Zajac*, No. 2:06-cr-00811 (D. Utah Sept. 13 and 16, 2010) (court issued order limiting latent fingerprint testimony and prohibiting opinion regarding individualization and permanence following *Daubert* hearing testimony about the role of bias and circular reasoning in the Mayfield error); *cf. Maryland* v. *Rose*, Case No. K06-0545, Mem. Op. at 5-9, 24-25, 28-31 (Balt. Co. Cir. Ct. Oct. 19, 2007) (citing Mayfield error as basis for characterizing expert testimony regarding absolute certainty and zero error rate for latent fingerprint identifications as "not credible" and excluding latent print evidence under pre-*Daubert* standard for admission of expert testimony). *But see United States* v. *Rose*, 672 F. Supp. 2d 723, 725-26 (D. Md. 2009) (rejecting argument that the Mayfield error called into question the reliability of the ACE-V methodology).

[23] NAS, *Strengthening Forensic Science*, 87-88, 103-06, 136-45. The National Academy of Sciences (NAS) is a nonprofit society engaged in scientific and engineering research. Congress established the NAS in 1863 to "investigate, examine, experiment, and report upon any subject of science or art" upon request by any department of the government. The operating arm of the NAS, the National Research Council (NRC), conducts most of its science policy and technical work.

information regarding the similarity of friction ridge features across a population to support the premises underlying claims of individualization, the lack of data about the discriminating value of various ridge formations and clusters of ridge formations, and the lack of supporting data and standardized criteria for distinguishing between a difference caused by distortion and a discrepancy. The NAS Report also questioned the deferential approach taken by the courts in admitting latent fingerprint evidence despite a lack of studies supporting its reliability, noting that courts have "give[n] fuel to the misperception that the forensic discipline of fingerprinting is infallible" and have relied upon "assumptions about fingerprint evidence [that] had been reached without the scientific scrutiny being accorded DNA."

In response to the NAS Report, the White House Office of Science and Technology Policy, National Science and Technology Council Committee on Science, created a Subcommittee on Forensic Science to develop strategic plans for improving forensic science capacity, infrastructure, standards, and quality management. The Subcommittee works through five interagency working groups, including a working group assigned to identify and prioritize forensic science research needs. These working groups have members from 13 federal agencies and recently added non-federal participants, such as lawyers, statisticians, academic experts, and state and local forensic science practitioners. The Subcommittee is scheduled to report on the feasibility of implementing the NAS recommendations by September 2011.

CHAPTER TWO
THE FBI LABORATORY'S IMPLEMENTATION OF THE OIG'S RECOMMENDATIONS

In this chapter, we describe each of the 18 recommendations we made in our initial review of the Mayfield error, explain the basis for each recommendation, and assess the FBI Laboratory's progress in implementing it. We also explain what steps remain necessary to address the concerns underlying the recommendation.

The sections below generally correspond to the organization of the recommendations made in our initial report. Section I discusses the FBI Laboratory's implementation of research projects recommended by the OIG and the FBI Laboratory's "Latent Review Teams." Section II addresses the FBI Laboratory's revisions to its Standard Operating Procedures (SOPs). Section III discusses changes to its documentation requirements. Section IV examines verification and blind verification procedures implemented by the FBI Laboratory after the Mayfield error. Section V discusses special reviews of casework performed by the FBI Laboratory to ensure that similar errors had not occurred. Section VI discusses changes to the FBI Laboratory's procedures for ascertaining and documenting the causes of errors.

In general, we conclude that the FBI Laboratory has made significant progress in implementing our recommendations. Based on changes made to its SOPs, manuals, and training materials after the Mayfield error and in response to concerns we identified during our follow-up review, 17 of our recommendations can be closed without further action by the FBI Laboratory. The FBI has resolved the remaining recommendation by working with DOJ's Criminal Division to complete a review of capital cases in which the FBI Laboratory performed latent fingerprint analysis before substantial revisions to its procedures went into effect in 2006. When this review is completed, the remaining recommendation can be closed.

I. Recommended Research Projects

After the Mayfield error, the Latent Review Teams reviewed the science underlying latent fingerprint identification and recommended research projects including:

- Research aimed at developing and testing a minimum quantitative threshold;
- Research to test the hypothesis that Level 2 and Level 3 details occur on friction ridges as independent, random events;

- Testing examiner performance in a rigorous, controlled manner to determine accuracy of performance;
- Comparison of the performance of examiners using a subjective approach to those using a minimum point threshold; and
- Research to determine the permanence of Level 3 details and features on the lower joints, soles, and palms.

We suggested two modifications to these proposed research projects: shifting emphasis from permanence to reproducibility of Level 3 detail and conducting research aimed at developing objective criteria for declaring identifications and providing scientific validation for the FBI Laboratory's methods of latent print examination.

A. Recommendation 1: Shifting Research Emphasis from Permanence to Reproducibility of Level 3 Details (Closed)

We recommended that the FBI Laboratory shift some of its research emphasis from the permanence of Level 3 detail on the finger to the reproducibility of Level 3 detail in latent fingerprints. The goal of this shift was to test whether Level 3 detail is present in latent fingerprints with sufficient consistency and reliability of appearance to serve as a valid basis for identification. We believed that focusing on the reproducibility of Level 3 details would enable the FBI Laboratory to define the circumstances under which examiners should use Level 3 details.

The FBI Laboratory has implemented this recommendation. The FBI Laboratory has completed Phase I of its Permanence Study and has provided the results to us in draft format. The study focused in part on whether fingerprints provide consistent and reliable representations of the three levels of friction ridge detail. The study concluded that Level 3 detail, while permanent on the finger, is not consistently reproduced in different friction ridge impressions, and that its appearance in fingerprints depends on the capture method, the pressure applied, and the resulting image quality.

In response to the study, the FBI Laboratory has changed its training materials to emphasize that the presence of Level 3 detail is an indication of the clarity of the print and to warn examiners that they should rely on it "[o]nly when a latent fingerprint is very clear, with similar deposition pressure as the exemplar." According to examiners we interviewed, the deposition pressure of a latent print as compared to an exemplar is determined by comparing thickness of the ridges and the furrows in the latent print and the exemplar.

As previously noted, Phase I of the FBI's Permanence Study analyzed the persistence of friction ridge detail on the finger over a period of 6 months, concluding that the three levels of detail are persistent on the skin. We note that 6 months is a relatively short period of time over which to measure the

question of permanence in Level 3 details. A large proportion of fingerprint examinations involve comparing exemplars with latent prints that were made far more than 6 months apart. Moreover, the fact that initial results indicate that Level 3 features are persistent on the finger over 6 months does not preclude the possibility that they may change more significantly over a long period of time. Phase II of the permanence study will address this issue over a 10-year period.[24] Taking into consideration the FBI Laboratory's commitment to this research, we determined that this recommendation should be closed.

B. Recommendation 2: Research to Develop Objective Criteria for Declaring Identifications and to Provide Scientific Validation for Latent Print Examination (Closed)

We also agreed with the Latent Review Team recommendation that the FBI Laboratory conduct research directed at developing objective criteria for declaring identifications and at providing scientific validation for the FBI Laboratory's methods of latent print examination. The goal of this research was to address issues raised by critics of the latent fingerprint discipline in general, and the "holistic" standard used at the FBI Laboratory in particular. We believed that the development of more objective criteria for identifications would provide a greater margin of safety in latent fingerprint identifications than is provided by a wholly subjective approach in which an examiner's initial or "gut" reaction might lead him to overlook important ambiguities or differences between latent and known fingerprints.

As discussed above, the FBI Laboratory completed a Quality Study that produced software designed to generate an objective score of latent fingerprint quality based on examiner consensus, called Latent Quality Assessment Software (LQAS). The FBI Laboratory has not, however, developed guidelines for how examiners should use LQAS to assist in assessing the quality of a latent fingerprint to determine whether it is "of value for identification" or to ascertain the amount of corresponding information needed to warrant an identification.[25] While such decisions would appear to be premature at this time given that the FBI Laboratory is still in the process of validating the software, examiners would benefit from having an objective measure to inform

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[24] We note fingerprint records available to the FBI likely include many instances in which multiple versions of known fingerprints were recorded from one individual many years apart, such as prints taken during two different arrests. Although the FBI Laboratory would not be able to control the recording techniques or conditions, this existing information would appear to provide a ready-made data set from which to examine the issue of permanence over time.

[25] *See* SWGFAST, Revised Draft for Comment, Standards for Examining Friction Ridge Impressions and Resulting Conclusions § 5.3.4 ("The sufficiency graph reflects the interplay between quality and quantity of minutiae and its relation to the decision thresholds and levels of complexity based on a consensus of collective experience.") [internal citations omitted].

and support decisions about the quality of a latent fingerprint, and validation should be a priority.

The FBI Laboratory has not begun research aimed at developing a quantitative standard for the sufficiency of conclusions, and it continues to assess sufficiency based on the relationship between the quality of the latent fingerprint and the number of corresponding details present rather than a standard, objective threshold. While this approach relies upon informal norms developed based on the training, experience, and common sense of the examiner, it also illustrates the subjectivity and lack of standardization cited by critics.[26] Research into the relationship between the quantity and quality of corresponding features and examiner conclusions is necessary to develop formalized measures of sufficiency and to support the reliability and repeatability of examiner conclusions.

We note, however, that factors other than the OIG's Recommendations provide an incentive for the FBI Laboratory or others to complete this research. As discussed above, issuance of the NAS Report has prompted research to validate the scientific basis for latent fingerprint examination, as well as White House efforts to address the shortcomings of the forensic sciences as a whole. Moreover, as discussed above, the NAS Report questioned the deferential approach taken by the courts in admitting latent fingerprint evidence.[27] Based on these criticisms, challenges to the admissibility of latent fingerprint testimony likely will continue, providing an additional motivation for the FBI Laboratory to conduct the necessary research.

We also note that, even without objective standards for sufficiency, the FBI Laboratory has adopted other measures intended to reduce the risk that an examiner's "gut" reaction might lead to an incorrect conclusion, including linear application of the ACE-V methodology; a disciplined, ridge-by-ridge approach to the analysis phase; separate documentation of the analysis and comparison phases; and blind verification in certain cases, including cases involving single identifications (like Mayfield) with the highest risk of error.

Research to develop objective criteria for declaring identifications will likely take many years to complete. The FBI and others in the field have abundant incentive to pursue such research, although the long-term availability of adequate funding is unknown. Taking into consideration the FBI Laboratory's commitment to this research, we determined that this recommendation should be closed.

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[26] *See, e.g.*, Jennifer L. Mnookin, "The Courts, the NAS, and the Future of Forensic Science," *Brooklyn L. Rev.* 75, Summer 2010: 1209-1275.

[27] NAS, *Strengthening Forensic Science*, 102-06 and n.79.

II. Revision of the Standard Operating Procedures (SOPs)

At the time of the Mayfield misidentification, the documents governing the FBI Laboratory's latent print operations (the SOPs for Examining Friction Ridge Impressions, the SWGFAST Friction Ridge Methodology for Latent Print Examiners, and the SWGFAST Standards for Conclusions) were vague. They did not define the analysis or verification process, provide step-by-step directions for each phase of ACE-V, or require detailed documentation in the case notes. As a result, although the examiners involved in the misidentification made errors, we concluded that they did not contravene any procedures or requirements set forth in the FBI Laboratory or SWGFAST standards. Nothing in the FBI Laboratory and SWGFAST documents, for example, required examiners to complete analysis of the latent fingerprint before moving to the comparison phase to avoid bias, or prohibited the circular reasoning and selective use of Level 3 detail that contributed to the error.

After the misidentification, one of the Latent Review Teams conducted a detailed review of the FBI Laboratory's SOPs and recommended major revisions. The OIG agreed with these proposed changes, also noting that the SOPs in effect at the time of the Mayfield misidentification contained no provisions addressing the specific causes of the error. As a result, we recommended that the FBI Laboratory make additional changes to the SOPs. We address the FBI's response to the recommendations for changes to the SOPs in this section.

As discussed in more detail below, the FBI Laboratory has made substantial revisions to its SOPs, and it continues to review and update its standards each year. It has not implemented every change recommended by the OIG, however, and Unit Chiefs Soltis and Wieners stated that this decision was motivated in part by concerns about keeping the SOPs to a usable length. Instead, the FBI Laboratory has chosen to incorporate some of our recommendations in its training materials, while it has addressed the concerns underlying other recommendations through broader changes to its application of the ACE-V methodology.

A. Recommendation 3: Major Revisions to the SOPs to Provide Specific Standards for Conducting Latent Fingerprint Examinations (Closed)

We agreed with the Latent Review Team recommendation that the FBI Laboratory add detail to the definitions and processes in each phase of ACE-V, but we also recommended revisions to prohibit or discourage the specific practices that contributed to the error, such as circular reasoning and "cherry-

picking" of Level 3 details.[28] We recommended that the FBI Laboratory, in making these revisions, consult INTERPOL's "Method for Fingerprint Identification" (Parts 1 and 2), as an example of a standard for examinations that provided a much higher level of detail in the description of examination steps and the application of principles of identification than is available in the existing SOPs and the SWGFAST Methodology and Standard.

Since the Mayfield error, the FBI Laboratory has substantially revised its SOPs for Examining Friction Ridge Impressions, adding 16 pages of content. In particular, the revised SOPs include separate sections for each step of the ACE-V methodology. Section 9.1 of the SOPs, for example, instructs examiners conducting analysis of a latent fingerprint to analyze it for evidence of distortion, determine whether it is "of value," and document the data used during analysis and the orientation of the print. Section 9.2 describes the specific actions required during the comparison phase, and Section 9.3 defines the three conclusions available to examiners. Additionally, Sections 9.4 and 9.5 outline the responsibilities of each party involved in the verification or blind verification process and provides specific instructions for the documentation and communication of results. We believe that these revisions represent significant progress.

The SOPs for Examining Friction Ridge Impressions do not explicitly prohibit circular reasoning or "cherry-picking," or require examiners to assign lesser individualizing value to characteristics that the examiner was unable to identify until the comparison phase. However, the revised SOPs do include some steps to avoid bias: examiners must complete and document analysis of the latent fingerprint before looking at any known fingerprint; examiners must separately document any data relied upon during comparison or evaluation that differs from the information observed during analysis; and verifiers or blind verifiers must separately complete and document their ACE examination. The FBI Laboratory refers to this approach as "linear" ACE-V, and Unit Chiefs Soltis and Wieners stated that it eliminates circular reasoning and "cherry-picking" by requiring examiners to identify the characteristics present in a latent fingerprint during analysis before moving to the comparison phase,

[28] Circular reasoning is the use of data from the known fingerprint to influence the characteristics observed in the latent fingerprint. It is a form of confirmation bias or "mindset" that can lead to unintentional false identifications. In the Mayfield error, for example, the original examiner encoded seven Level 2 details in the latent fingerprint before being exposed to any candidate fingerprints. After running an IAFIS search and viewing Mayfield's fingerprint, the examiner changed his interpretation of five of these seven points. Additionally, similarities between the Madrid latent fingerprint and Mayfield's known fingerprint led the examiner to see other similarities that were not actually present.

rather than "parachuting in" and noticing similarities between the latent and known fingerprints.[29]

The SOPs for Examining Friction Ridge Impressions do not include as much detail about detecting and comparing specific friction ridge characteristics as does the INTERPOL Method. For example, the INTERPOL Method (Part 2) includes guidance on analyzing the individualizing value of certain minutiae, differentiating between types of ridge formations, reconstructing ridge flow, and marking corresponding points. The INTERPOL Method also states that circular reasoning "is a scientific fallacy" and "has to be strictly avoided," and it provides techniques for avoiding bias.

The FBI Laboratory, however, addresses many of these topics in its training modules. For example, one training module states that bias and mindset become major concerns when dealing with complex prints, which the SOPs define as latent or known fingerprints exhibiting poor quality, irregular substrate, excessive deposition or lateral pressure, or limited Level 2 detail. The training materials provide techniques for avoiding bias, such as tracing the entire unknown print before looking at the known, reconstructing the deposition pressure to "reverse engineer" distortions, or turning the print upside down or looking at it obliquely to get a different perspective. Although nothing in the training materials assigns lesser individualizing weight to characteristics identified in the latent fingerprint during the comparison phase rather than in the analysis phase, trainers tell examiners that "Any 're-analysis' made during the comparison stage of ACE-V should be treated with caution."

Because Unit Chief Soltis told us that examiners are more likely to consult the SOPs than the training materials if they have a question, we would prefer similar language addressing bias and circular reasoning in the SOPs. Nonetheless, the Laboratory's modifications of its SOPs and training modules sufficiently address the OIG's concerns to permit this recommendation to be closed.

B. Recommendation 4: Explanations for Differences (Closed)

One major cause of the Mayfield error was the FBI Laboratory's reliance on explanations for differences in appearance between the Madrid latent fingerprint and Mayfield's known fingerprint that were not consistent with the

[29] *See*, *e.g.*, Itiel E. Dror, "How Can Francis Bacon Help Forensic Science? The Four Idols of Human Biases," *Jurimetrics* 50 (2009): 100-101 (stating that a strictly linear approach to ACE-V in which no "re-analysis" is allowed may be "throwing the baby out with the bathwater," and speculating that a solution to bias may be requiring initial analysis of the latent fingerprint in isolation from the known fingerprints, but also permitting, with clear and detailed documentation, some "re-analysis" of the latent print after comparison).

available physical evidence. In particular, examiners attributed differences in the upper left quadrant of the two prints to a "double tap," despite a lack of evidence of deposition pressure or movement to support that explanation, and failed to account for differences in ridge shapes and in distances between purported corresponding points that could not be explained by distortion. As a result, examiners interpreted these differences as explainable dissimilarities rather than as discrepancies requiring exclusion.

To address this concern, we recommended that the FBI Laboratory revise its SOPs for Examining Friction Ridge Impressions to require examiners to justify their explanations for differences on the basis of objective information and to attain a standard of certainty for those explanations equal to that required for identifications. We believed that accepting plausible or reasonable explanations supported by mixed evidence was inconsistent with the certainty claimed for identifications, and that the appropriate conclusion was "inconclusive" or "exclusion" where the examiner was unable to achieve the requisite certainty for explanations for differences.

At the beginning of our follow-up review, the FBI Laboratory had not revised the SOPs for Examining Friction Ridge Impressions to address the standard of certainty required for explanations for differences. The SOPs required that examiners evaluate the quality of a fingerprint and identify and document signs of distortion during the analysis phase. They also encouraged examiners to document explanations for differences observed during complex comparisons and stated that "[d]istortion is not a discrepancy and is not a basis for exclusion." The SOPs, however, provided no guidance on how to distinguish between an explainable difference and a discrepancy.

The FBI Laboratory instead had chosen to address this issue in its ACE-V training materials rather than in its SOPs. For example, one training module told examiners that there must be a "rational explanation supported by physical evidence" for differences between latent and known fingerprints, or that differences must be explainable based on "the available data" or "observations from analysis." Other training materials warned against complex explanations for differences, stating, "Complex events are less likely to occur than simple ones, therefore the simpler explanation is usually the most valid one," and "If you have to 'explain' the majority of a print to make a match, then maybe you should think again." These training materials, however, did not require a specific standard of certainty for explanations for differences, nor did they explain how examiners should determine whether a difference is explainable where the physical evidence is mixed.

While the examiners we interviewed told us that they have to be "very certain" of their explanations for differences to declare an identification, and the "rational explanation" standard set forth in the training materials in place at the beginning of this review is consistent with the language used in the

INTERPOL Method, we believed that additional guidance was necessary.[30] Specifically, we believed that the SOPs or the training materials should be modified to require that the examiner's certainty in each explanation for a difference must be consistent with the degree of certainty required for an identification. To address our concern, the FBI Laboratory has updated its SOPs and training materials with the following language:

> § 9.3.1 Identification
>
> - An examiner must be confident that any apparent difference between two prints is due to distortion, and not an actual difference in friction ridge detail. This level of confidence must be consistent with the degree of confidence an examiner must have in order to render an identification decision.

The FBI Laboratory has added the same language to its training materials. This modification permits this recommendation to be closed.

C. Recommendation 5: Revision of the SOPs to Provide Guidance on the Use of Level 3 Detail (Closed)

We identified faulty reliance on Level 3 detail as a major cause of the Mayfield error. In making the identification of Mayfield, examiners needed to consider matching Level 3 detail, relying on a pair of incipient dots considered to be a "very persuasive" corresponding feature, as well as pores and groups of pores found on ridge formations. Many of these apparent Level 3 details, however, were the result of distortions or variations in the latent or known fingerprints. For example, several experts concluded that the Madrid latent fingerprint was not of sufficient quality to support any reliance on Level 3 detail, and the two dots interpreted as a corresponding feature were present only in one set of Mayfield's rolled prints, but not in flat impressions taken the same day or in another set of Mayfield's rolled prints. Examiners also did not take into account or seek to explain differences in Level 3 detail, instead considering them to be within the tolerance of variability in appearance.

As a result, we recommended that the FBI Laboratory revise the SOPs for Examining Friction Ridge Impressions to define when the clarity of a latent fingerprint is sufficient to support reliance on Level 3 details. To address the specific practices that caused the improper use of Level 3 detail, we recommended that the FBI Laboratory revise the SOPs to require that examiners (1) consult all versions of the available known fingerprints to determine whether Level 3 details utilized to support an identification are

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[30] INTERPOL Method, Part I (2000) and Part II § 8.5 (2004) (requiring rational explanation for differences between latent and known fingerprints based on "findings or facts" or on "facts and circumstances that are demonstrable").

reliably and repeatably reproduced, and (2) apply "fair reasoning" in the use of Level 3 detail so that when a dissimilarity is "explained away" on the basis that the information is not of sufficient quality to be reliable, information of equal quality also should not be deemed valid and used as the basis to find a similarity.

The FBI Laboratory had not made these revisions at the outset of our follow-up review. While the SOPs for Examining Friction Ridge Prints stated that Level 3 detail is used in conjunction with Level 1 and Level 2 detail to form a conclusion, and required that examiners assess the effects of distortion on all three levels of detail, they otherwise did not define when and how examiners should use Level 3 detail. Nor did the SOPs require examiners to check all available versions of the known prints or to apply "fair reasoning" in the use of Level 3 detail.

The FBI Laboratory did provide guidance in its training materials on use of Level 3 detail. Unit Chiefs Soltis and Wieners told us that the FBI remodeled its ACE-V training to emphasize that Level 3 detail is "transitory" (not reliably reproduced in both known and latent fingerprints) and depends on the overall quality of the print. One training slide, for example, instructed examiners to carefully assess a fingerprint for distortion when looking at Level 3 detail and cautioned that they should consider Level 3 detail "[o]nly when the latent print is very clear, with similar deposition pressure as the exemplar."

The training materials, however, did not tell examiners to obtain all versions of the known fingerprints or to apply "fair reasoning" when relying on Level 3 detail to support an identification. According to Unit Chiefs Soltis and Wieners, such explicit requirements were unnecessary. Examiners could and did request copies of all known prints if they had a question, and trainees were informed that they could go to the Criminal Justice Information Services Division (CJIS) files and get more known prints to analyze. Unit Chiefs Soltis and Wieners also explained that the "ridges-in-sequence" technique implicitly requires "fair reasoning" because examiners must note all of the characteristics in the latent fingerprint before moving to the comparison phase. Moreover, they said that the risks that concerned the OIG are present in a small minority of cases involving complex prints and single identifications, and other procedures adopted since the Mayfield case, such as documentation and blind verification requirements, would address those concerns.

Our assessment of the FBI Laboratory's response to our recommendation regarding Level 3 detail was influenced by our understanding of the changing way FBI examiners are using Level 3 detail. The examiners we interviewed told us that they were extremely cautious in relying on Level 3 details during the comparison phase, that they relied on agreement of Level 3 details in an extremely small percentage of identifications, and that they would not let agreement in Level 3 details be the deciding factor in declaring an identification

if there was insufficient Level 2 detail. We were told that under FBI Laboratory procedures, Level 3 detail does not, on its own, provide a basis for an examiner to identify or exclude a source.

We believe that this conservative approach is appropriate in light of the findings of the FBI's Permanence Study that although Level 3 detail is permanent on the finger, the appearance of Level 3 details such as ridge edge shapes and pores in fingerprints may vary significantly depending on deposition pressure and other factors. According to the Draft Permanence Report, the appearance of Level 3 details, including "edge contour, ridge width and pore placement on the ridge[,] varied significantly on the same subject regardless of whether the prints were captured on the same date or from month to month." The prints that were the subject of this observation were made under highly controlled conditions; it follows that the inconsistency in appearance of Level 3 detail would be even greater for latent fingerprints created accidentally. This variability poses obvious difficulties for relying on Level 3 details in declaring identifications or exclusions.

We thus continued to be concerned with the problem of "fair reasoning" in Level 3 detail. Because deposition pressure and other factors can so easily affect the appearance of Level 3 details, we believed that differences in appearance in Level 3 details are readily explained away as distortions, even in clear latent prints.[31] Fair reasoning requires that the distorting influence of deposition pressure also be taken into consideration in assessing similarities in Level 3 details. Apparent similarities may be coincidences that are the product of differences in deposition pressure. The danger of such misleading coincidences is particularly great where the apparent similarities involve singular features (such as a single Level 3 dot or a single unusually shaped pore) rather than a series of connected Level 3 features in a unique pattern.

We agreed that the linear "ridges in sequence" approach described to us by Soltis and Wieners provides some assurance that fair reasoning will be applied, by requiring the examiner to confront differences in appearance as well as similarities. We remained concerned, however, about the lack of specific

[31] Indeed, Section 9.3.2 of the SOPs conspicuously did not require an exclusion in the case of any discrepancy in Level 3 detail. In other words, the SOPs treated any differences in appearance of Level 3 features as presumptive distortions, but permitted the use of Level 3 similarities to support identifications. This approach, if followed literally, could have resulted in inadvertent cherry-picking of Level 3 similarities to support an identification while disregarding all Level 3 differences as distortions. While the revised SOPs do not explicitly address this issue, we believe that the changes to the SOPs and training materials discussed in connection with Recommendation 4, specifying the degree of confidence required for explanations for differences, and the additional documentation requirements for Level 3 detail discussed below will reduce the likelihood of it occurring.

guidance about the use of Level 3 detail in the current version of the SOPs. To address our concerns, the FBI has added the following language to the SOPs:

§ 8.3 Level Three Detail

- Because the appearance of level three detail is highly variable depending on deposition pressure and other factors, level three detail should be used to support an identification only when the corresponding area of the latent print is reliable and with similar deposition pressure as the exemplar. If level three detail is significantly relied upon to reach a conclusion it must be documented.

§ 9.1 Analysis

- If level three detail is a significant factor in determining a latent print to be of value, the level three detail relied upon to reach that decision must be documented.

§ 9.2 Comparison

- If level three detail is a significant factor in determining a latent print to be of value and the level three detail in the corresponding area of the available known [fingerprint] is not reliable, the examiner must check all available known prints on file to determine if the level three detail relied upon to support a conclusion is reliably and consistently reproduced.

The FBI Laboratory also added these points to its training modules.

These modifications address our concerns regarding the use of Level 3 detail. This recommendation is closed.

D. Recommendation 6: Disagreements with Other Law Enforcement Agencies (Closed)

In April 2004, approximately 3 weeks before Mayfield was arrested on a material witness warrant, the FBI Laboratory learned that the SNP disagreed with its identification of Mayfield as the source of the Madrid latent fingerprint. After receiving the SNP's "negativo" report, representatives of the two agencies met to discuss the differences between their conclusions. Our report determined that the FBI Laboratory did not view this meeting as an opportunity to learn more about the SNP's position, but rather to explain its own position. As a result, the FBI Laboratory did not take the SNP's conclusions as seriously as it should have.

We concluded that the FBI Laboratory should have determined the basis for the SNP's disagreement and arranged for a new examination by an unbiased examiner before re-committing to the validity of its original conclusion. We thus recommended that the FBI Laboratory revise its SOPs or other manuals to address disagreements with other forensic laboratories, requiring that it (1) fully understand the reasons for disagreement by another forensic laboratory and (2) assign new examiners to conduct a complete ACE-V examination of the disputed print.

The FBI Laboratory has implemented this recommendation. The Laboratory Operations Manual now includes practices for handling scientific or technical disagreements with other forensic laboratories. These practices require that an examiner who learns of a disagreement inform and provide documentation explaining the nature and extent of the conflict to his Unit Chief. The Unit Chief and the Section Chief must review this documentation and attempt to resolve the conflict with the other forensic laboratory or law enforcement agency. The Unit Chief then must document any resolution of the conflict. If the parties cannot achieve resolution, the Unit Chief must document all aspects of the conflict, including the reasons why the conflict remains unresolved and recommendations for further action, and bring the matter to the attention of the managing Deputy Assistant Director (DAD). The DAD will approve or reject the recommendations, or will direct other actions as needed to resolve the conflict. If necessary, the DAD will discuss the recommendations with the Assistant Director (AD). Once achieved, any resolution must be communicated in writing to the other forensic laboratory or law enforcement agency and in an electronic communication to all affected FBI Laboratory parties involved in the conflict. The Latent Print Units (LPU) also require blind verification of conclusions reached after an external disagreement.

While these procedures do not explicitly state that the FBI Laboratory must fully understand the reasons for disagreement, we believe that the documentation, communication, and blind verification requirements will adequately ensure that the FBI Laboratory does not take a one-sided approach to conflicts with other forensic laboratories. These procedures represent important steps toward ensuring the accuracy of the FBI Laboratory's conclusions. Recommendation 6 can be closed.

E. Recommendation 7: Cluster Identifications (Closed)

Although cluster identifications did not play a primary role in the misidentification of Mayfield, the SNP concluded that the latent fingerprint erroneously individualized to Mayfield was made at the same time as another latent fingerprint found on the plastic bag, and it identified Daoud as the source of both prints. The Latent Review Team recommended that the FBI Laboratory detail the process for identifying cluster prints and require that at

least one area of the cluster meet the identification threshold on its own, unless research is conducted to support the validity of combining minutiae from several different fingerprints in the cluster. While we agreed with the recommendation that the FBI Laboratory develop criteria for declaring that latent fingerprints were deposited simultaneously, we questioned the requirement that friction ridge detail on one finger stand alone. We thought that this "stand alone" requirement potentially undermined a major rationale for making cluster identifications – that is, to permit identification where the pattern configuration of two or more latent fingerprints is consistent with simultaneous deposition by the same hand but no single fingerprint in the cluster contains sufficient information to identify the source.

The SOPs for Examining Friction Ridge Impressions require that one area of the cluster independently meet the threshold for identification. As a result, the FBI does not do cluster identifications unless the contributor sees probative value in determining if the prints were placed side-by-side by consecutive fingers. Although this approach does not fully implement our recommendation, we recognize that the FBI Laboratory has a valid basis to require that one area of the cluster stand alone. According to Unit Chief Wieners, current scientific research has not provided a basis for making cluster identifications. One study, for example, found that examiners presented with fingerprints from different fingers from the same source deposited at the same time reached a correct conclusion only 88 percent of the time.[32] Indeed, the only court to have considered the admissibility of cluster identifications under *Daubert* held that their use had not been generally accepted by the relevant scientific community or validated by any study or scientific article.[33] Given that the FBI Laboratory's current approach is more cautious and less likely to result in erroneous identifications, we believe that the FBI Laboratory has sufficiently addressed this recommendation, and it can be closed.

F. Recommendation 8: Use of the "Inconclusive" Determination (Closed)

We recommended that the FBI Laboratory revise the SOPs for Examining Friction Ridge Impressions to clarify that the "inconclusive" conclusion is available where an examiner, during the evaluation phase, is unable to achieve adequate certainty either as to the quantity and quality of detail in agreement

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[32] John P. Black, "Pilot Study: The Application of ACE-V to Simultaneous (Cluster) Impressions," *Journal of Forensic Identification* 56, no. 6 (2006): 933, 949-50, 952 (explaining that participants were correct 88 percent of the time when they rendered a conclusive true or false opinion, but that they rendered a conclusive response only 73 percent of the time and, as a result, reached accurate results in only 64 percent of the examinations).

[33] *See Commonwealth* v. *Patterson*, 840 N.E.2d 12, 29-33 (Mass. 2005).

or the sufficiency of the explanations for differences. The following hypothetical illustrates a situation in which this clarification would become relevant:

An FBI examiner analyzes a latent print. He finds that it has Level 2 detail including (for example) 10 ridge deviations, with good clarity and no red flags. It is deemed of value for identification. During the comparison phase, the examiner finds agreement as to Level 1 and 2 details. If there were no differences, these similarities would be sufficient in quality and quantity to support an identification. However, the examiner finds a difference in appearance: an apparent ridge deviation in the latent that cannot be found in the corresponding location of the exemplar. There are a number of plausible explanations for this difference, such as slippage or debris on the finger or substrate, but the "physical evidence" to support these explanations is not compelling. As a result, the examiner is uncertain whether the dissimilarity is a discrepancy (potentially requiring exclusion) or a distortion (permitting identification).

The FBI Laboratory's SOPs do not clearly permit the examiner to declare an "inconclusive" in this hypothetical. Section 9.3.3 of the SOPs incorporates a long-standing definition under which an "inconclusive" determination is appropriate "when a qualified examiner is unable to identify or exclude the source of a print because the corresponding areas of friction ridge detail are absent or unreliable," such as "when a corresponding area is not captured in the available exemplar(s), or the corresponding area [of the exemplar] is unusable due to distortion." Under this definition, "inconclusive" is available only when the known fingerprints are incomplete or distorted and examiners potentially could reach a conclusion if given access to a better set of exemplars. Indeed, the FBI examiners we interviewed all told us that they only use the inconclusive conclusion because of problems with the known prints, not because of uncertainty associated with potential explanations for differences.

Despite the wording of the definition in the SOPs, Unit Chiefs Soltis and Wieners initially told us that use of "inconclusive" would be available in situations like Mayfield – that is, where an examiner is not certain of his explanations for differences and sees many similarities between known and latent fingerprints. Because we did not believe that this use of the "inconclusive" decision was readily apparent from the SOPs, we recommended that Section 9.3.3 of the SOPs be modified to make clear that examiners can use the "inconclusive" determination when they are uncertain whether differences in Level 1 or 2 details are discrepancies or the product of distortion or are uncertain of their explanations for differences.

In response, and after further discussions within the Latent Print Units, the FBI Laboratory stated that this use of "inconclusive" would be inconsistent with its requirement that latent fingerprints be "of value for identification." The FBI Laboratory stated that expanding use of "inconclusive" to circumstances

where examiners are uncertain of their explanations for differences could be harmful, as it could lead to comparison of less reliable latent fingerprints instead of a determination that those prints are of "no value." Additionally, Unit Chiefs Soltis and Wieners expressed concern that a broader use of "inconclusive" could result in inappropriately providing a "maybe" to a jury absent accurate, validated statistical models. According to Unit Chiefs Soltis and Wieners, some forensic laboratories use "inconclusive with corresponding features noted," but the FBI Laboratory does not because of concerns about potential bias and the risk of wrongful arrest or conviction.[34]

However, a limited exception to the FBI Laboratory's use of "inconclusive" exists for national security cases. If a latent fingerprint is submitted to the FBI Laboratory for intelligence purposes and examiners determine that the fingerprint, based on all of the known fingerprints sent to them, is inconclusive, the FBI Laboratory would communicate that information to the investigators with the caveat that the determination could not be used in court and that, if the latent fingerprint had to come back into the lab, it would be examined by an entirely different group of examiners. Because of these factors, any subsequent examiner could look at the latent fingerprint and determine that it is of "no value." We believe that similar safeguards could be made applicable to communicating "inconclusive" determinations to investigators in ordinary criminal matters.

Additionally, we believe that allowing examiners to use "inconclusive" where they are uncertain of their explanations for differences is not necessarily inconsistent with the FBI Laboratory's "of value" standard. Where, for example, a latent fingerprint is of sufficient quality to be "of value" and has many similarities to the known fingerprint, but has a distorted area that prevents the examiner from conclusively declaring a match, deeming that latent fingerprint to be of "no value" would be inappropriate. "Inconclusive" should be available in such scenarios.

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[34] Consistent with this approach, the FBI Laboratory recently has added the following language to its SOPs to clarify its use of "no value" and require documentation changes from "value" to "no value" during the comparison phase:

> § 9.2 Comparison
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> - If during comparison, an examiner determines that the unknown print does not contain sufficient reliable detail to reach an identification conclusion, then the Examiner must change his or her value decision to "no value" and document by single striking and initial[ing] the [symbol the examiners use to denote that a print is of value]. This does not include prints determined to be of "value" for exclusion only.

As described on pages 9 and 10 above, Unit Chief Soltis stated that in a hypothetical scenario involving a complex print in which the examiner is uncertain whether the dissimilarity is a discrepancy (potentially requiring exclusion) or a distortion (permitting identification), the examiner may determine, after the comparison phase, that the latent print is "not of value for identification." The print is not discarded. This is the scenario for which the OIG recommended the expanded use of the "inconclusive" conclusion. One reason for making this recommendation was that the "inconclusive" determination might permit the FBI to indentify the latent fingerprint later in the event that known fingerprints for the true source of the print are discovered (as happened in the Mayfield case). The FBI Laboratory's "not of value for identification" result would not entirely preclude this result, because the latent fingerprint would not be discarded, but to make an identification in this admittedly unusual situation would require the FBI to *again* reverse its determination regarding whether the latent print was of value for identification. The difficulty for the FBI in testifying regarding such an identification of a latent fingerprint that the FBI previously determined to be "not of value for identification" is obvious. The existence of the prior determination may be required to be disclosed under *Brady* v. *Maryland,* 373 U.S. 83 (1963), under which prosecutors are required to disclose certain material evidence that is favorable to the accused. By contrast, a prior result of "inconclusive" arising out of a comparison of the print with a different person's exemplars would not create the same difficulties. We acknowledge that our concern relates to an extremely unusual circumstance, albeit one that potentially could arise in the case of a difficult comparison such as the one in the Mayfield case.

Nonetheless, we recognize that the relationship between a forensic laboratory's "of value" and "inconclusive" definitions represents an ongoing difference of opinion in the latent fingerprint discipline. We appreciate that the FBI Laboratory has adopted its standards in an effort to ensure that examiners base their conclusions on reliable data. This recommendation is closed.

G. Recommendation 9: Elimination of the 12-Point Rule (Closed)

At the time of the Mayfield error, the FBI Laboratory had a rule requiring written supervisory approval for any identification based on fewer than 12 corresponding points of Level 2 detail. Although we concluded that additional review required under this "12-point rule" would not have prevented the error because examiners mistakenly assessed 15 points in agreement, we nonetheless agreed with the Latent Review Team that the rule should be eliminated. We believed that this numerical standard was inconsistent with the "holistic" approach used by the FBI Laboratory and would be rendered redundant by the FBI Laboratory's research aimed at developing and testing a minimum quantitative threshold.

The FBI Laboratory has implemented this recommendation, having eliminated the "12-point rule" in October 2005. As discussed above, the FBI Laboratory has not begun research aimed at developing a quantitative standard for the sufficiency of conclusions, and thus additional revisions are unwarranted at this time. This recommendation is closed.

III. Documentation

Two of the OIG recommendations related to documentation requirements for latent print examination.

A. Recommendation 10: Documentation of the ACE-V Process (Closed)

At the time of the Mayfield misidentification, FBI Laboratory procedures did not require documentation of the different phases of the ACE-V process, only a statement of the conclusion. As a result, no complete contemporaneous record existed of the criteria used to identify Mayfield or of examiners' explanations of differences. The Latent Review Team conducting the review of the FBI Laboratory's documentation procedures after the Mayfield misidentification concluded that the SOPs and manuals did not contain sufficient detail pertaining to case-note documentation, resulting in a variety of methods by which examiners documented their examinations and results.[35] To address these shortcomings, the Latent Review team made approximately 24 specific recommendations for revisions to the FBI Laboratory's documentation procedures, including requiring that examiners determine latent fingerprint value during the analysis phase, document explainable dissimilarities and discrepancies during comparison, and include sufficient detail in the case notes and on annotated photographs to allow another examiner or supervisor to evaluate the analysis and interpretations.

We concluded that better documentation of the analysis and comparison phases may have allowed the examiner and verifier to appreciate the cumulative impact of dissimilarities and the low quality of similarities between the latent and known fingerprints and avoid the erroneous identification of Mayfield. As a result, we agreed with the Latent Review Team that more rigorous documentation of the examination process was necessary. We believed that requiring separate documentation of each phase of the ACE-V process would help increase accuracy by requiring examiners to complete a pre-comparison analysis phase, promoting reproducible application of the

[35] Melissa A. Smrz, *et al.*, "Review of FBI Latent Print Unit Processes and Recommendations to Improve Practices and Quality," *Journal of Forensic Identification* 56, no. 3 (2006).

criteria for identification or exclusion, providing full identification of differences in appearance, and facilitating review of the causes of errors.

The FBI Laboratory has made significant changes to the documentation requirements in its SOPs for Examining Friction Ridge Prints. The SOPs now require that examiners create sufficient documentation, including annotated photographs and case notes, to allow another examiner to evaluate the examination and replicate any conclusions, and they include specific documentation requirements for each phase of the ACE-V process:

- Examiners must separately document the analysis phase on photographs and in case notes, including evidence of distortion and "red flags," before moving to the comparison phase. During analysis, examiners also are encouraged to document poor quality latent or known prints, irregular substrate, excessive deposition or lateral pressure, or limited Level 2 detail. These types of factors suggest that abnormal distortion has produced "red flags" requiring complex analysis.
- Examiners also must separately document the subsequent phases of the ACE-V process. During the comparison phase, for example, an examiner using data from the latent fingerprint that he did not mark during the analysis phase must document that data on a second photograph rather than adding to the analysis documentation. The goal is to retain documentation of the analysis phase that is not "contaminated" with information observed during comparison to the known fingerprint.
- For complex fingerprints, such as those exhibiting excessive deposition or lateral pressure or made in an irregular substrate, documentation may include notations regarding consistencies, dissimilarities, pressure distortion, discrepancies, and other relevant information, as well as requests for consultation with other examiners.
- Examiners conducting IAFIS searches must document the searches in the case notes, stating any conclusions reached and, for comparisons resulting in identifications, must include print-outs of comparison screens containing marked minutiae.
- Examiners must mark their conclusions on photographs of the latent fingerprint and in the case notes with the appropriate annotations. For example, a latent fingerprint identified to a particular source would be marked on the photograph and in the case notes with the identification symbol and would indicate the correct anatomical source, the name of the individual, the FBI number or date of birth, and other biographical information.

- Examiners conducting verifications and blind verifications must separately document their examinations and conclusions on unmarked photographs and in the case notes.

These changes represent substantial progress toward resolving our concerns and address a key criticism of the latent print discipline as a whole. Drs. Lyn and Ralph Haber, critics of latent fingerprint methodology, have noted that contemporaneous bench notes of ACE-V examinations are rarely required and rarely made.[36] Additionally, criminal defendants have used the failure to document ACE-V examinations as a basis to challenge the admissibility of latent print evidence under *Daubert*.[37] By requiring documentation of examiners' reasoning and conclusions, the FBI Laboratory better ensures the reliability and accuracy of its work.

We believed, however, that the FBI Laboratory should further modify its SOPs to require that examiners document explanations for differences in Level 1 and Level 2 detail. The SOPs in place during the follow-up review stated that documentation for complex fingerprints "may include" notations regarding distortion, dissimilarities, and discrepancies, but this was not mandatory. The FBI Laboratory has addressed our remaining concern by adding the following language to Section 9.7 of the SOPs for Examining Friction Ridge Impressions:

> When a complex analysis or a complex conclusion results in an identification, examiners must document any explanation for differences in level one or two detail caused by apparent distortion and identify the supporting data for their explanation in the case record.

The addition of this language permits this recommendation to be closed.

B. Recommendation 11: Documentation of the Analysis Phase and "Red Flags" (Closed)

Although we generally agreed with the Latent Review Team recommendations, we recommended that the FBI Laboratory refine the proposed changes to the SOPs to require separate documentation of the analysis phase on photographs and in case notes, including any "red flags" indicating deposition and pressure distortion. We believed that this would help prevent circular reasoning by preventing the examiner from using features

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[36] Haber and Haber, *Challenges to Fingerprints*, 79-82, 176-77.

[37] *Vargas*, 471 F.3d at 265-66 (admission of latent print testimony despite examiner's failure to memorialize his analysis with notes was not plain error); *New Hampshire* v. *Langill*, 945 A.2d 1, 11 (N.H. 2008) (exclusion of latent print testimony based on examiner's failure to record examination in bench notes exceeded the trial court's gatekeeping function, but lack of documentation potentially served to undermine credibility and weight of testimony).

observed in the known fingerprint to influence his analysis of the latent fingerprint. We recognized, however, that this requirement may not be appropriate in the case of IAFIS searches that do not result in identifications; we thus recommended that examiners be permitted to complete a preliminary comparison to determine that one of the known prints obtained in an IAFIS search is sufficiently similar to warrant a more comprehensive comparison before completing documentation of the analysis phase.

As noted above, the revised SOPs for Examining Friction Ridge Impressions require examiners to document the analysis phase before moving to the comparison phase. Although the SOPs do not explicitly use the term "red flag," they require examiners to identify and document factors causing distortion, including excessive deposition or lateral pressure. The SOPs also require examiners relying on data not marked during the analysis phase to document that data on a second photograph rather than adding to the analysis documentation, with the goal of retaining documentation of the analysis phase that is not "contaminated" with information from comparison to the known fingerprint. Although the SOPs do not require that examiners assign lesser weight to data marked after comparison to a known fingerprint, the training materials warn that "re-analysis" during the comparison stage should be treated with caution.

We noted in our initial review that creating a record of the analysis phase could be burdensome in the case of IAFIS searches that do not result in identifications. Nonetheless, the SOPs for Examining Friction Ridge Impressions contain no exception for documenting analysis of latent fingerprints that will be used in an IAFIS search. Instead, the SOPs for IAFIS require that latent fingerprints searched in IAFIS be "of value" and that examiners document all IAFIS searches, including those that do not result in a comparison or identification, in an IAFIS Search Form Guide. Examiners also must document any conclusions reached and include print-outs of comparison screens containing marked minutiae for comparisons resulting in identifications.

These requirements represent significant improvements in the FBI Laboratory's procedures and are major steps toward reducing circular reasoning and bias. This recommendation is closed.

IV. Verification Procedures

We made four recommendations relating to the FBI Laboratory's verification procedures in our original report.

A. Recommendation 12: Documentation of Verifications (Closed)

At the time of the Mayfield misidentification, the FBI Laboratory conducted verifications only for identifications, and examiners could select and consult with the verifying examiner. As a result, the verifying examiner not only knew he was reviewing an identification, but he knew whose conclusion he was reviewing. Additionally, supervisors could select a second verifying examiner if the first one declined to confirm the identification, all without documentation. These factors were potential sources of confirmation bias, and they contributed to a culture in which "[t]o disagree was not an expected response."

The Latent Review Team concluded that these factors may have played a role in the misidentification of Mayfield and recommended changes to the FBI Laboratory's verification procedures, including requiring that supervisors select the verifying examiner and mandating an independent examination and documentation of the verification. We found insufficient evidence to conclude that the FBI Laboratory's verification procedures were a contributing cause of the Mayfield error, particularly given that three experienced FBI Laboratory examiners and a court-appointed expert identified Mayfield as the source of the latent fingerprint. Nonetheless, we agreed with the Latent Review Team's recommendations for changes to the verification procedures because they would promote more thorough and unbiased examinations by verifiers in all cases.

The FBI Laboratory has implemented these changes. As discussed above, while the FBI Laboratory continues to require verification of identifications only, the verifying examiner is selected by a supervisor. Although the verifying examiner knows the conclusion reached by the original examiner, he is required to apply the ACE methodology to reach an independent conclusion and to document his examination and conclusion on unmarked photographs and in the case notes.

While continuing to limit verifications to cases in which a subject has been individualized potentially retains a source of confirmation bias, the FBI Laboratory has taken steps to reduce the risk of bias in cases where the risk of error is greatest. As discussed in more detail below, the FBI Laboratory has implemented a requirement that certain conclusions be blind verified. We believe that these measures, taken together, adequately address our recommendation. Recommendation 12 is closed.

B. Recommendation 13: Blind Verifications (Closed)

The FBI Laboratory did not conduct blind verifications at the time of the Mayfield error. To address concerns that the verification process created bias, the Latent Review Team recommended that the FBI Laboratory require one

blind verification per report and include a decoy latent print and a decoy exemplar in the package given to the verifying examiner. Under the process contemplated by the Latent Review Team, up to 10 percent of the blind verification packages would contain "challenging" non-identifications, so that the verifying examiner would know that there was a chance that none of the prints in his package previously had been matched by another examiner.

We recommended two modifications to the Latent Review Team's proposed changes: that the FBI Laboratory use decoy non-identifications in a small percentage of all verifications, and that the original examiner be uninvolved in choosing the decoy prints. We believed that these changes would lessen bias by making examiners aware of the possibility that no identification had been made and would improve the independence and objectivity of the verification process.

The FBI Laboratory has taken a different approach to conducting blind verifications. During our follow-up review, we learned that the FBI Laboratory discussed many approaches to blind verification in an attempt to find one that would not cause excessive disruption to the pace of casework. Unit Chief Wieners said, for example, that he worked with several examiners to create decoy prints and find latent fingerprints and ten-print cards to replicate actual comparisons, but these efforts were difficult and time consuming.

According to Unit Chiefs Soltis and Wieners, the FBI Laboratory instead decided to conduct blind verifications of "single conclusions," when only one unknown print is individualized, excluded, or declared "inconclusive," following comparison with one or more exemplars.[38] According to the FBI, this focuses resources on the situations presenting the highest risk of error and prevents the verifying examiner from knowing the conclusion reached by the original examiner without interrupting the workflow of the unit. Single identifications, which pose the highest risk of a false positive, are both verified and blind verified. The FBI Laboratory also requires blind verification of any analysis change involving a single previously reported print, such as where examiners disagree about the value of a latent fingerprint, and all final identification decisions that required conflict resolution. Blind verifications may be conducted for complex prints, where an examiner changes his opinion from "value" to "no value," or in any other situation at the discretion of a supervisor.

[38] The use of blind verification for cases involving single conclusions of "exclusion" or "inconclusive" in the situation in which multiple prints have been identified to a particular person is counterintuitive. However, requiring blind verification in these circumstances ensures that blind verifiers receive a certain number of non-identifications, so as to prevent them from assuming they are examining a latent print that has previously been identified to a particular person by another examiner.

The FBI Laboratory has taken additional steps to insulate the blind verifier from the conclusion reached by the original examiner, including requiring supervisors to select the examiners who conduct blind verifications, selecting the blind verifier from a different team than the original examiner to reduce the likelihood that he has overheard discussions about the case, providing one unmarked copy of the photograph of the latent fingerprint to avoid indicating that the original examination resulted in an identification, and providing photographs rather than IAFIS screen images to avoid bias caused by the knowledge that IAFIS "matched" the prints. These measures appear to have been successful, as the examiners we interviewed told us that they were unable to guess the original examiner's conclusions when they receive a blind verification package.

While these procedures differ from our original recommendation, we believe that they represent significant progress in reducing confirmation bias in the cases presenting the highest risk of an erroneous identification and address our underlying concerns. Recommendation 13 is closed.

C. Recommendation 14: Second Independent Verification of Single Identifications Resulting from IAFIS Searches (Closed)

We also recommended that the FBI Laboratory consider requiring a second independent verification for single identifications resulting from an IAFIS search. Although we recognized that this recommendation would target an extremely narrow category of cases, such as the Mayfield case, we believed it would address the situations posing the greatest risk and most significant consequences of a false identification.

Current FBI Laboratory procedures require that all single identifications, not just those resulting from IAFIS searches, be verified and blind verified. In light of the steps taken by the FBI Laboratory to ensure the independence of verifications and blind verifications described above, such as requiring supervisors to select examiners to perform verifications and blind verifications and creating a culture in which examiners feel free to disagree, this fully implements our recommendation. Recommendation 14 is closed.

D. Recommendation 15: Use of Alternatives to "Dispute Resolution" in Refused Verifications (Closed)

The Latent Review Team recommended that the FBI Laboratory implement a "conflict resolution" process to resolve conflicting conclusions. While we agreed that the FBI Laboratory should implement procedures to address disputed verifications, we recommended that the FBI Laboratory consider an alternative to treating disagreements among examiners as potential errors requiring resolution. We believed that invoking "conflict resolution" between the original examiner and the verifier potentially diluted the

verification requirement and created the possibility that one examiner would be "talked into" agreeing with the other. To address these concerns, we recommended that disputed verifications be subject to a full examination by new examiners.

The FBI Laboratory's current approach to disputed verifications retains both the "conflict resolution" terminology and the requirement that examiners attempt to resolve their differences informally. As discussed above, where the original and verifying examiners disagree about the conclusion, the Unit Chief requires the examiners to "trade papers" and discuss the disagreement. Any unresolved differences are referred up the chain of command to the Unit Chief, Section Chief, and managing Deputy Assistant Director for resolution, with the most intractable disputes addressed by convening a Scientific Resolution Board (SRB) to make recommendations to the Assistant Director.

Despite the FBI Laboratory's continued use of "conflict resolution" terminology to describe its process for resolving refused verifications, Unit Chiefs Soltis and Wieners told us that disagreements between examiners are not treated as errors and carry no threat of corrective action. Instead, they said that the process contemplates an academic approach to determine what the facts show, what conclusions have objective support, and what the FBI Laboratory can stand behind. Alice Isenberg, Chief of the Biometrics Analysis Section, concurred that disagreements between examiners are not treated as errors.

Additionally, although we learned in our initial review of the Mayfield error that disagreements among examiners were extremely unusual, the examiners we interviewed as part of this review all told us they had been involved in at least a few situations in which the examiner and the verifier reached differing conclusions. The examiners we interviewed said that they feel free to disagree when conducting verifications and blind verifications, and that they had never been intimidated into accepting another examiner's conclusion during conflict resolution or made to feel like a disputed verification was viewed as an error. According to these examiners, while disagreements remain infrequent, there is no longer an expectation that verifying examiners will agree with the original conclusion. These facts suggest a fundamental shift in the FBI Laboratory's latent print culture.

In the course of this follow-up review, we identified an issue relating to the dispute resolution process that we did not spot during the initial Mayfield review. Under the procedures in effect during our follow-up review, the FBI Laboratory required documentation of examiner disputes resolved through discussions at the Unit Chief level or above, and of disputes that the FBI Laboratory could not resolve even after formal conflict resolution. However, examiners were not required to document the informal resolution of conflicts achieved by "trading papers" and discussing their disagreements. Although the

examiners we interviewed told us that they routinely documented disputed verifications resolved through discussions between examiners in the case notes or on a photograph, this was not mandatory. Moreover, in no case was resolution of a disagreement included in the report to the contributor. Although the FBI Laboratory maintained that information about disputed verifications was in the case file and thus was available to prosecutors upon request, we were concerned that the failure to require documentation of disputes resolved through discussions between examiners or to mention the results of conflict resolution in the report issued to the contributor may raise potential issues under *Brady*. In light of broad interpretations of *Brady* in certain jurisdictions, we recommended that the FBI Laboratory consult with the FBI Office of General Counsel (OGC) and with the Department of Justice (DOJ) Criminal Division regarding how this information should be documented and communicated to the prosecutor.

To address these concerns, the FBI Laboratory added the following language to its Latent Print Unit Quality Assurance Manual and Latent Print Operations Manual:

> Latent Print Unit Quality Assurance Manual, Practices for Blind Verification
>
> § 4.4 Conflict Resolution
>
> If differences of opinion are apparent after blind verification, the primary examiner and the blind verifier will follow the FBI Laboratory Operations Manual, Practices for Scientific or Technical Casework Conflict Resolution to resolve these differences. All facets of this process will be documented in the case file. This may include, but is not limited to, the occurrence of discussions, the final resolution, notes and marked photographs. All final identification decisions that required conflict resolution will be blind verified prior to reporting the results.
>
> Latent Print Operations Manual, SOPs for Examining Friction Ridge Impressions
>
> The FBI Laboratory has added a Conflict Resolution section after Sections 9.4 (verification) and 9.5 (blind verification).
>
> § 9.6 Conflict Resolution
>
> If a conflict occurs, the primary examiner and the verifier or blind verifier with whom they are in conflict will follow the FBI Laboratory Operations Manual, Practices for Scientific or Technical Casework Conflict Resolution. All facets of this process will be documented in the case file. This includes, but is not limited to,

the occurrence of discussions, the outcome of the process, notes, and marked photographs.

The effect of these changes was to require the creation of a written record in the case file reflecting the existence and resolution of every conflict between the primary examiner and the verifying examiner, even in cases where this conflict was resolved informally.

The FBI and the DOJ Criminal Division consulted with Andrew Goldsmith, DOJ's National Coordinator of Criminal Discovery Initiatives, to confirm that these changes are sufficient to ensure that the government meets its *Brady* obligations. After this consultation, the FBI told us that it will reinforce the FBI Laboratory's practice of providing case notes and other supporting documentation whenever a latent print contributor report is requested, even if the requestor does not ask for these materials, by revising the mandatory training provided by the FBI OGC to new employees and by including a reminder about responses to discovery requests in a future issue of its internal newsletter. The revised training materials provided to the OIG by the FBI OGC make clear that examiners must (1) document in the bench notes any disputes regarding the conclusions reached, any evidence-related examiner differences of opinion or conclusions, and any changes in examiner opinions or reports following examiner discussions; (2) include bench notes in the case file; and (3) produce the entire case file, including case notes and supporting documentation such as SOPs, in response to a discovery request even if the attorney requests only the examiner's forensic report. The training also specifies that all requested discovery material must be sent through the FBI Laboratory's OGC staff to the relevant prosecutor even if the request is made by a defense attorney. As a result of these changes, documentation relating to conflict resolution will routinely be provided to prosecutors in response to discovery requests.

We also learned during our review that the Latent Prints Units have begun anonymously tracking anecdotal examples of differences of opinion between examiners as part of an informal project seeking to determine why disagreements occur. The goal of the current project is to collect data and potentially to create a more formal, systematized method for tracking examiner consultations and disagreements. While we understand the sensitivity of this issue and the tension between monitoring disagreements and creating an environment in which scientific debate is welcomed, we think that information derived from such a study could be beneficial and lead to more accurate, consistent conclusions.

Recommendation 15 is closed.

V. Special Reviews

We recommended that the FBI undertake several special reviews following the Mayfield error.

A. Recommendation 16: Review of Prior IAFIS Identifications from Digital Prints (Closed)

The FBI Laboratory used a high-resolution, scaled digital image of the Madrid latent fingerprint, rather than the original evidence or photographs of the latent fingerprint prepared from silver halide negatives, to conduct IAFIS searches and identify Mayfield. Out of concern that image quality was a cause of the Mayfield error, the FBI Laboratory reexamined cases in which a latent fingerprint was identified as the result of an IAFIS search performed using a digital image, without examiners having received the original evidence. The FBI Laboratory reviewed and blind verified 16 IAFIS identifications in 14 cases matching the exact criteria of the Mayfield error and found no false positives. Because we concluded that the use of digital images was not a cause of the error, however, we recommended that the FBI Laboratory reexamine a broader category of cases, including cases in which a criminal suspect was identified based on a single latent fingerprint searched through IAFIS, regardless of whether the image used to conduct the search was digital.[39]

The FBI Laboratory found 205 identifications made through IAFIS using single prints between June 1999 and September 2004. According to Unit Chief Wieners, 31 of those identifications had been previously blind verified or were made in cases with multiple identifications and were thus eliminated. The FBI laboratory reexamined and blind verified the remaining 174 single IAFIS identifications, confirming the original results. We are satisfied that these searches ensure that the FBI Laboratory did not make similar errors in the cases presenting the greatest chance of a false positive, and thus Recommendation 16 is closed.

B. Recommendation 17: Capital Case Review (Resolved)

After the Mayfield error, the FBI Laboratory and the DOJ Criminal Division began a monthly "Capital Case Review" of prisoners awaiting execution

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[39] As discussed above, identifications based on a single latent fingerprint present the highest risk of a false positive. Additionally, searches conducted using automated fingerprint identifications systems like IAFIS may introduce another source of bias and heighten the risk of incorrect identifications by expanding the pool of known fingerprints searched and increasing the chances that a search will produce highly similar fingerprints from different sources. *See, e.g.,* Itiel E. Dror and Jennifer L. Mnookin, "The Use of Technology in Human Expert Domains: Challenges and Risks Arising from the Use of Automated Fingerprint Identification Systems in Forensic Science," *Law, Probability & Risk* 9, April 2010: 47, 53-55.

to determine whether the latent print unit had conducted analysis in the case that resulted in the death sentence, or in an earlier case that may have been an aggravating factor in the death penalty phase. Although the review had identified no such cases as of March 2006, we recommended that the FBI Laboratory continue the Capital Case Review or adopt another procedure sufficient to accomplish the same objectives. We believed that these efforts would address the unlikely possibility that similar misidentifications had occurred in capital cases.

To conduct the reviews, the Criminal Division's Capital Case Unit (CCU) prepared a list of state and federal death row inmates with a scheduled execution date in the following month and sent it to the FBI Laboratory each month. The CCU relied on the website maintained by the Death Penalty Information Center (DPIC) to prepare this list.[40] A CCU employee checked the DPIC website for the names of inmates scheduled for execution the following month, then searched Westlaw to determine whether any of the cases involved latent fingerprint evidence. The list sent to the FBI Laboratory included every inmate scheduled for execution the following month, highlighting the cases that potentially involved latent fingerprint evidence. Although the list did not specify the date of conviction or sentencing for each inmate, it is likely that the inmates listed were convicted or sentenced long before the Mayfield error.[41] Using this list, the FBI Laboratory searched its databases to determine whether any of the cases involved latent fingerprint analysis by its latent print unit.

Between May 2004 and February 2008, the FBI Laboratory searched its databases for the names of 347 state and federal death row inmates scheduled for execution the following month.[42] Of these, 11 were cases in which FBI

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[40] *See* DPIC, "Upcoming Executions," http://www.deathpenaltyinfo.org/upcoming-executions (accessed February 28, 2011). DPIC is a non-profit organization that studies and prepares reports on capital punishment. Courts have cited it as a source of death penalty data. *See*, *e.g.*, *Kennedy* v. *Louisiana*, 554 U.S. 407, 460 n.7 (2008) (citing DPIC historical data); *United States* v. *Caro*, 597 F.3d 608, 639 (4th Cir. 2010) (citing DPIC data on common prior-conduct aggravators); *United States* v. *Fell*, 571 F.3d 264, 282 (2d Cir. 2009) (citing DPIC data regarding federal death row inmates in states without the death penalty); *Harbison* v. *Little*, 571 F.3d 531, 536 (6th Cir. 2009) (citing DPIC report on methods of execution).

[41] In 2008, for example, the average time elapsed from sentence to execution was 139 months. *See* Bureau of Justice Statistics, "Capital Punishment, 2008 – Statistical Tables," Table 11, December 2009, http://bjs.ojp.usdoj.gov/content/pub/pdf/cp08st.pdf (accessed December 6, 2010).

[42] Between 2004 and 2008, 251 inmates were executed. At year end 2008, 3,207 inmates were under sentence of death. *See* Bureau of Justice Statistics, "Capital Punishment, 2008 – Statistical Tables," Tables 4 and 15, December 2009, http://bjs.ojp.usdoj.gov/content/pub/pdf/cp08st.pdf (accessed February 28, 2011). The list of upcoming executions maintained by DPIC and used as the basis for the CCU's list includes those subject to a stay of execution, likely accounting for the difference between the number of names forwarded to the FBI Laboratory and the number of executions carried out during this

(Cont'd.)

latent print examiners had conducted examinations, and only one involved an identification. The FBI Laboratory blind verified the conclusions in these 11 cases and found no errors. The FBI Laboratory reported these results to the CCU in a spreadsheet listing the names received, the cases that involved latent fingerprint analysis, and the outcome of any reexaminations.

The Capital Case Review stopped in February 2008, when the CCU ceased providing names to the FBI Laboratory. We learned that this discontinuation was not the product of a specific decision. Although CCU attorneys initially were responsible for preparing and sending the lists of death row inmates to the FBI Laboratory, by 2008 an administrative support employee had assumed this responsibility. In March 2008, this employee went on extended leave, and the reviews were not reassigned during her absence or resumed upon her return. FBI Laboratory personnel we interviewed stated that they attempted to contact the CCU and inquire about the status of the reviews but received no response.

Additionally, we received information that, even before the reviews were discontinued, the CCU sometimes did not provide names to the FBI Laboratory in a timely manner. One FBI Laboratory employee told us that she had at times received lists late, or received lists that included several months of upcoming executions, and had only a day or two to conduct the reviews before the date of the first scheduled execution.

During our follow-up review, we told the FBI and the CCU that we believed these reviews should continue in some form, but that the methodology used to identify death row inmates must be more rigorous. In particular, we encouraged the CCU and FBI Laboratory to obtain prisoner data from the states.[43] To avoid concerns about the timely completion of reviews, we suggested that the CCU and FBI Laboratory compile a master list of current state and federal death row inmates in which convictions or sentencing occurred before December 31, 2006, as well as the death row inmates executed since March 2008, and to identify any cases in which the FBI Laboratory performed latent fingerprint analysis, prioritizing the cases according to the

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time period. *See, e.g.*, DPIC, "The Death Penalty in 2007: Year End Report," December 2007, http://www.deathpenaltyinfo.org/2007YearEnd.pdf (accessed February 23, 2011) (in 2007, 42 executions took place and more than 40 cases received stays of execution because of lethal injection challenges).

[43] Information on death row inmates is collected annually by the Bureau of Justice Statistics (BJS). *See* Bureau of Justice Statistics, "Capital Punishment (NPS-8)," http://bjs.ojp.usdoj.gov/index.cfm?ty=dcdetail&iid=253 (accessed December 6, 2010). Although the raw data collected by BJS is subject to strict confidentiality protections and use limitations, *see* 42 U.S.C. §§ 3735, 3789g (2006), the states presumably maintain the information necessary to comply with their annual reporting obligations and should be able to provide the FBI Laboratory and Criminal Division with a list of names.

scheduled execution date. We believed that this would permit the CCU and FBI Laboratory to identify and blind verify cases at one time, rather than doing so on an ongoing basis.

The FBI has informed us that it is in the process of compiling a list of inmates and completing the necessary reviews. Specifically, the FBI has consulted with the Bureau of Justice Statistics (BJS) and determined that 21 states disclose the names of prisoners awaiting execution and the dates of conviction on official government websites. For the remaining 13 states that continue to have the death penalty but do not publicly disclose inmate data, the FBI has obtained information from 1 and has requested information from the other 12. For inmates whose convictions occurred before December 31, 2006, the FBI Laboratory will cross-reference their names through its Evidence Control System database to determine whether the FBI Laboratory conducted any latent print analysis associated with these cases. If the FBI Laboratory did conduct such analysis, it will request the file from storage and review it using blind verification. The FBI Laboratory told us that it will prioritize cases in which there is an upcoming execution date.

The FBI Laboratory also told us that it has recently reviewed the cases of 144 inmates executed between March 2008 and February 22, 2011, the period when the Laboratory was not receiving names of prisoners scheduled for execution from the CCU. The FBI Laboratory stated that it searched its Evidence Control System and determined that it processed evidence in 15 of the 144 cases. The FBI Laboratory determined that it previously had reviewed 2 of these 15 cases. For the remaining 13, it re-examined the prints and blind verified any single conclusions, finding no errors.

Once completed, these reviews will permit this recommendation to be closed.

C. Recommendation 18: Explanations for Errors (Closed)

Under the procedures in place at the time, the LPU created little documentation about the causes of the Mayfield error. Not only was the examination documentation incomplete, but the examiners' written explanations for the causes of the error were insufficiently specific and failed to provide useful details about how or why the error occurred. As a result, we recommended that the FBI Laboratory require more detailed written explanations in the future for any errors producing an incorrect result or conclusion and assign responsibility for this documentation to examiners who were not involved in the error.

The FBI Laboratory Operations Manual has detailed corrective action procedures that apply where there is an error that produces an incorrect result or conclusion, called an "analytical/interpretive error." The FBI Laboratory

considers these errors to be "Level 1 nonconformities" if they directly affect and have a fundamental impact on the quality of the work product. In the event such an error occurs, the corrective action procedures require that the Standards and Practices Program Manager handle the corrective action and identify and document the "root cause" of the error. Possible corrective actions may include remedial training, supplemental proficiency testing, suspension from casework, notification of the contributor, and issuance of amended or supplemental reports.

Combined with the additional documentation required for examinations and verifications, which should help to reveal the contemporaneous reasoning leading to any errors, we believe that this requirement adequately implements Recommendation 17. This recommendation is closed.

VI. Conclusion

In conclusion, we believe that the FBI Laboratory has made significant progress in implementing many of the recommendations from our Mayfield Report. Changes to the FBI Laboratory's procedures and training materials made in the course of this review, such as providing further guidance on the use of Level 3 detail and improving documentation of explanations for differences, represent substantial steps toward reducing the likelihood of errors. We encourage the FBI Laboratory to continue funding and conducting research aimed at validating latent fingerprint analysis and at creating objective criteria for determining sufficiency and declaring an identification. We also strongly support the efforts by the FBI and the CCU to identify the remaining capital cases in which the FBI Laboratory conducted latent fingerprint analysis before December 31, 2006, and to complete the Capital Case Review. We believe that the FBI Laboratory must continue to address these issues to avoid future errors, improve the reliability and accuracy of the latent fingerprint discipline as a whole, and ensure public confidence in the results of its examinations. We believe that full implementation of our recommendations will help the FBI Laboratory in this effort.