Document Title: ACHIEVING INTEROPERABILITY FOR LATENT FINGERPRINT IDENTIFICATION IN THE UNITED STATES

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Item #	Page	Para#	Current text	Suggested text	Comment	Severity
#1	ii	4	Austin **Hickland**	Austin **Hicklin**	Spelling mistake	Incorrect
#2	1	2	any **left** fingerprint by an unknown source	any fingerprint **left** by an unknown source	words transposed	Editorial
#3	1	3	The algorithms assess friction ridges and other features found on the underside of the finger and on the palm, **collectively referred to as "minutiae."**	The algorithms **match based on "minutiae" and other friction ridge features found on the underside of the fingers and palms.**	Minutiae are a specific type of friction ridge features. Features such as cores and deltas, incipient ridges, etc, are not minutiae. The basic AFIS algorithms extract the ridge features and match these features against features found in an exemplar that is in the targeted search database.	Incorrect
#4	1	3	AFIS systems, first introduced in the 1970s, generate a list of potential candidates that share similar fingerprint features **to an encoded image of** the print through the use of image **recognition** algorithms.	AFIS systems, first introduced in the 1970s, **use image processing algorithms** to generate a list of potential candidates that share similar fingerprint features **with** the print.	"Image processing" not "image recognition" algorithms. They don't use encoded images, rather encoded representations of the images	Clarification
#5	1	4	Developers of AFIS software differentiate themselves from their market competitors by creating algorithms that mitigate variations in latent print quality.	Developers of AFIS software differentiate themselves from their market competitors by **independently** creating algorithms **to extract features and match images.**	Differentiation was primarily driven by the fact that the developers worked in isolation from each other. Their attempt to improve the product further differentiated the product as new approaches were implemented. Later in the paper this is well explained. Accounting for differences in latent quality is one of a variety of ways that differentiate AFIS.	Misleading
#6	2	1	the Extended Feature Set (EFS)	Add a footnote: "EFS refers to the definition of fingerprint/palmprint features incorporated in the ANSI/NIST-ITL standard starting in 2011."	Need to cite what EFS refers to, since it is not a standalone document.	Misleading
#7	2	1 (cont)	the Extended Feature Set (EFS), which defines a common **file** format	"the Extended Feature Set (EFS), which defines a common **markup** format" OR "the Extended Feature Set (EFS), which defines a common **feature** format"	EFS is not a file format. Throughout, the relation between EFS, AN, EBTS, and LITS needs to be clarified. It is misstated often in the first half of the paper.	Incorrect

#8	2	footnote 1	U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Latent Interoperability Transmission Specification. NIST Special Publication 1152, January 2013, and U.S. Department of Justice, FBI, Electronic Biometric Transmission Specification (EBTS) Technical and Operational Update (TOU) 10.0.2, June 2, 2014.	U.S. Department of Commerce, National Institute of Standards and Technology (NIST), Latent Interoperability Transmission Specification **(LITS)**. NIST Special Publication 1152, January 2013**. The FBI's EBTS is compliant with LITS (**U.S. Department of Justice, FBI, Electronic Biometric Transmission Specification (EBTS) Technical and Operational Update (TOU) 10.0.2, June 2, 2014**)**.	The footnote implies LITS is EBTS. They are peers: essentially LITS is an extension of EBTS.	Misleading
#9	3	3	The algorithms assess friction ridges and other features found on the underside of the finger and on the palm, collectively referred to as "minutiae."	The algorithms **match based on "minutiae" and other friction ridge** features found on the underside of the fingers and palms.	Minutiae are a specific type of friction ridge features. Features such as cores and deltas, incipient ridges, etc, are not minutiae. The basic AFIS algorithms extract the ridge features and match these features against features found in an exemplar that is in the targeted search database.	Incorrect
#10			Ten-print records are used in civil applications such as background checks and to determine immigration status; they are also used in the intelligence arena to identify known or suspected terrorists, and in the criminal justice system to identify perpetrators of crime.	Ten-print records are used in civil applications such as background checks and to determine immigration status; they are also used in the intelligence arena to identify known or suspected terrorists, and in the criminal justice system to identify **arrestees and** perpetrators of crime.	Identity confirmation of an arrestee's identity is a primary function of tenprint processing	Minor point
#11	3	4	Modern AFIS systems use automatic **and standardized** methods to encode a new ten-print image and search it against existing ten-print	delete "and standardized"	The methods are not necessarily standardized as all vendors use different algorithms. However, since the images are processed automatically, there is no need for standardization: what happens inside the proprietary algorithms is transparent to the users.	Incorrect
#12	4	1	An AFIS search can introduce additional variations among latent prints that might have been generated from the same individual.	Delete sentence	Not true.	Incorrect
#13	4	1	they mark up the **minutiae features** that can be identified on the friction ridges that appear in the image.	"they mark up the **features"** OR "they mark up the **minutiae"**	"Minutiae features" doesn't make sense.	Incorrect

#14	4	2	Developers of AFIS software have created different methods for encoding features seen in a latent print and algorithms for comparing latent prints to previously recorded ten-print records **in order to differentiate themselves from their market competitors**	Developers of AFIS software have **independently** created different methods for encoding **the features of latent prints,** and algorithms for comparing latent prints to previously recorded ten-print records.	The differentiation occurred because the developers worked independently of each other and there were no existing data exchange standards. In their quest to improve accuracy, the vendors pursued different algorithmic approaches, further differentiating the products. (See related comment on pg 1, para 4)	Misleading
#15	4	Figure 2	[image of a latent print]	Replace latent image with one more representative	The image is unusually high quality for a latent, which could be misleading for readers. Suggest using a more realistic latent.	Misleading
#16	5	1st bullet	through the adoption of a common **file** format, the Extended Feature Set (EFS),	through the adoption of a common **feature** format, the Extended Feature Set (EFS),	EFS is not a file format	Incorrect
#17	5	1st bullet	which has incorporated the EFS as the standard submission format and LITS as its transaction standard for all of its latent print searches.	which has incorporated the EFS **into** the standard submission format and **uses EBTS (which is LITS-compliant)** as its transaction standard for all of its latent print searches.	a) EFS is part of the format, not the format itself; b) NGI uses EBTS, which is LITS compliant; it does not use LITS directly; c) add footnote to cite EBTS	Incorrect
#18	5	bullet 4		AFIS testing of EFS features was conducted by NIST, showing the accuracy of systems using interoperable features. [Footnote:Indovina, M, R. A. Hicklin, and G. I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets, Evaluation #1." NISTIR 7775. March 2011. AND Indovina, M., V. Dvornychenko, R. A. Hicklin, and G. I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets, Evaluation #2." NISTIR 7859. May 2012.]		Clarification
#19	5	bullet 4	has improved through the introduction of an online Extended Feature Set training tool	insert text: "has improved through **the development of standardized guidelines for feature markup, and** the introduction of an online Extended Feature Set training tool" Add citation: Chapman, et al. "Markup Instructions for Extended Friction Ridge Features." NIST Special Publication 1151. Jan 2013.		Clarification

#20	5	footnote 2	NIST, Latent Interoperability Transmission Specification, and FBI, EBTS TOU 10.0.2.	delete "FBI, EBTS TOU 10.0.2." from this footnote. Move that to a separate footnote when the (new) reference to EBTS is made in the next sentence.		Correction
#21	6	1		Insert sentence: "The accuracy of image-only searches (in which an examiner does not encode minutiae) has increased greatly, but agencies often do not provide a means for these transactions to be exchanged among agencies."	The paper spends a great deal of time dealing with the interoperability problems of EFS feature-based searches, but does not note anything about image-only searches (for which interoperability is much less of an issue), except as future technology .	Misleading
#22	6	3	seamless data sharing across networks or systems can only occur after adoption of information sharing policies between agencies and **co-located workstations and integration of software to re-encode the latent print.**	seamless data sharing across networks or systems can only occur after adoption of information sharing policies between agencies and **the integration of software to to support the exchange of data.**	The introduction of co-located workstations and re-encoding is not necessary and is confusing at this point. Co-located workstations and re-encoding are not "seamless data sharing".	Misleading
#23	7	2	NGI will soon have the capability to combine biometric identifiers as search parameters to increase the accuracy of a search.	Delete sentence	While NGI can or will permit the combination of biometrics to improve accuracy, this is not relevant to latent prints (combining face and iris with 10-prints is reasonable - but not with latents).	Misleading
#24	7	2	In this multimodal biometric context, interoperability through the adoption of the national standards will be critically important because the effectiveness of a particular search will depend on jurisdictional utilization and submissions to NGI.	Delete sentence	National standards for facial images and iris images are well defined.	Misleading
#25	7	4	Vendors capitalized on the fact that AFIS systems improved the **accuracy** of identification	Vendors capitalized on the fact that AFIS systems improved the **likelihood** of identification	AFIS systems enable examiners to make identifications: the accuracy of those identifications resides with the examiners. AFIS vastly increases the likelihood of identification.	Misleading
#26	7	4	dramatically reduced the amount of time necessary to identify or exclude a **record from the candidate list** by searching against a database of electronic ten-print records of arrested and convicted offenders.	dramatically reduced the amount of time necessary to identify or exclude a **subject** by searching against a database of electronic ten-print records of arrested and convicted offenders.	Does not make sense as written.	Incorrect
#27	8	1	and while **most** AFIS systems are interoperable for ten-print record searches,	delete "most"	I do not believe that there are any 10-print AFIS that are not interoperable.	Misleading

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#28	8	2	IAFIS became **fully** operational in 1999	IAFIS became operational in 1999	IAFIS tenprint matching capability became operational in 1999; latent capability was not fully operational until 2000. Since the sentence is about 10-print, deleting "fully" is sufficient.	Minor point
#29	8	3	Given the low accuracy of **optical recognition machine learning** at the time, latent examiners had to manually **label** minutiae and **then perform remote searches on already marked up prints,** rather than submit unmarked latent prints directly for searching against the system as is currently done in ten-print searching.	Given the low accuracy of **automated feature extraction algorithms** at the time, latent examiners had to manually **mark minutiae**, rather than submit unmarked latent **images** for searching against the system as is currently done in ten-print searching.	a) "Optical recognition" has an unrelated meaning. b) "Manually label … and then perform remote searches" is misleading	Incorrect
#30	8	3	It also decreased the likelihood an FBI search would be made because to perform these extra searches, examiners had to submit images that **had been re-encoded** to comply with the IAFIS submission requirements, **typically through the State.**	It also decreased the likelihood an FBI search would be made because to perform these extra searches, examiners had to submit images that had **to be re-encoded** to comply with the IAFIS submission requirements.	State and local are searched using native encoding techniques, later they had to be re-encoded to search against IAFIS.	Misleading
#31	8	3	To standardize submissions to IAFIS (and now to NGI), the FBI required compliance to Electronic Biometric Transmission Specification (EBTS) **that has now incorporated the Extended Feature Set (EFS) fingerprint file format**.9 EBTS is based on a standard developed by the American National Standards Institute (ANSI) and the Information Technology Laboratory of NIST (ANSI/NIST-ITL **1-2000**). These standards included specifications on image resolution, common field names, and how to include personal information and details on why the fingerprint record was created. More recently, NIST has developed the LITS **standard** to specify which EFS features are required for latent search submissions.10	To standardize submissions to IAFIS (and now to NGI), the FBI required compliance to Electronic Biometric Transmission Specification (EBTS).9 EBTS is based on a standard developed by the American National Standards Institute (ANSI) and the Information Technology Laboratory of NIST (ANSI/NIST-ITL). These standards included specifications on image resolution, common field names, and how to include personal information and details on why the fingerprint record was created. **EFS was incorporated into ANSI/NIST-ITL in 2011 and into EBTS in 2012.** More recently, NIST has developed the LITS **specification which extends EBTS into non-FBI uses, and specifies** which EFS features are required for latent search submissions.10		

#	Page	Line	Original Text	Suggested Change	Rationale	Category
#32	8	4	More recently, NIST has developed the LITS standard to specify which EFS features are required for latent search submissions.	More recently, NIST has developed the LITS **specification to specify how EFS features are to be organized and marked up for interoperable data exchange between latent AFIS systems. LITS is fully compatible with the FBI's EBTS; both are "application profiles" based on the ANSI/NIST-ITL base standard.**	Clarifies the relationship between LITS, EBTS, and ANSI/NIST.	Misleading
#33	8	5	the search capabilities and improved speed.	Insert new sentence after "the search capabilities and improved speed." to read as follows: A recent major development of NGI was the implementation of a palm matching capability which significantly extends the ability of the examiner to identify latents. Add footnote to new sentence "About 30% of all crime scene latents are palmprints."	Makes stronger case for improving interoperability with NGI.	Clarification
#34	10	1	Local law enforcement agencies **typically only** search their own AFIS, sometimes search their State's AFIS,	Local law enforcement agencies **often only** search their own AFIS, sometimes search their State's AFIS,	Overstated	Clarification
#35	10	footnote 11	Many include policy/legal issues **in addition to print quality** such as lack of data sharing policies.	delete "in addition to print quality"	Does not make sense as written.	Clarification
#36	12	2	There is a State-level daily query limit for latent searches that exceeds States' current utilization of the system.	Delete sentence	When IAFIS was implemented, there were maximum quotas for each state, but those were far in excess of the actual use of the system, then or now. However, that point is not particularly relevant to the discussion.	Clarification
#37	12	3	According to the NIJ survey, the majority of States (77%) receive latent requests from law enforcement agencies with an AFIS from outside of their State, but **just over half** described these requests as being routine.		Clarify: is this over 50% of states, or just over half of the 77%?	Clarification
#38	16	7	NIST **and ANSI** worked extensively to establish	NIST and **the Committee to Define an Extended Fingerprint Feature Set (CDEFFS)** worked extensively to establish	ANSI certifies NIST as a standards development organization: ANSI did not work to establish the standard. CDEFFS (discussed on p19) developed EFS, in coordination with NIST	Incorrect

#39	16	7	NIST and ANSI worked extensively to establish a standard set of friction ridges and other minutiae that must be included to search other systems. The EFS standard provides comprehensive and consistent definitions of minutiae for use in fingerprinting. It also specifies methods for encoding features found on fingerprints and palm prints as well as how to annotate the quality of the feature.	In developing EFS, NIST and the Committee to Define an Extended Fingerprint Feature Set (CDEFFS) worked extensively to establish comprehensive and consistent definitions of fingerprint and palmprint features, and methods for encoding those features, for use as an interoperable AFIS interchange format.		Clarification
#40	16	6 (bottom of page)	establish a standard set of friction ridges and	establish a standard set of friction ridge **features** and		Incorrect
#41	17	2	localities are not making it a requirement of the contractual agreements with their AFIS vendor.	localities are not **generally** making it a requirement of the contractual agreements with their AFIS vendor**s (exceptions include Orange County, California and WIN).**		Misleading
#42	17	2	Since its incorporation into the fingerprint and biometric ANSI/NIST-ITL **1-2011 Update: 2013** standard	Since its incorporation into the fingerprint and biometric ANSI/NIST-ITL standard **in 2011**	ANSI/NIST-ITL has regular updates (every since the 1980s, and the 2015 update is being scoped now). Referring to the standard in general is more appropriate here. The statement as written wasn't really accurate: it was adopted into ANSI/NIST-ITL 1-2011; which subsequently had minor revisions in 2013.	Misleading
#43	17	1 (top of page)	The EFS **standard** provides	The EFS **specification** provides	EFS is a specification, not a standard; it is incorporated within the ANSI/NIST 2011 standard.	Incorrect
#44	17	box	The EFS **standard** provides	The EFS **specification** provides	See comment #32	Incorrect
#45	17	box	The LITS **standard**	The LITS **specification**	LITS is a specification, not a standard	Incorrect

#46	17	box	The EFS standard provides comprehensive and consistent definitions of minutiae for use in fingerprinting. This standard defines the features to be used in both ten-print and latent print searches. The LITS standard describes what information is required for a latent print search transaction to occur across jurisdictions, regardless of originating and destination AFIS system vendor.	The EFS **specification** provides comprehensive and consistent definitions of **fingerprint and palmprint features, for use** in both ten-print and latent print searches. **EFS refers to the definition of fingerprint/palmprint features incorporated in the ANSI/NIST-ITL standard.** The LITS **specification** describes what information is required for a latent print search transaction to occur across jurisdictions, regardless of originating and destination AFIS system vendor. **LITS is parallel with and compatible with the FBI's EBTS: LITS extends EBTS to focus on cross-jurisdictional vendor-neutral transactions.**	A definition of EFS needs to make it clear that it is part of the ANSI/NIST-ITL standard. EBTS is very heavily used; its relation to LITS needs to be clear.	Misleading
#47	18	2	Beyond some of the technical limitations that still remain with NGI,	Delete phrase or make clear what this refers to.	No idea what this is intended to refer to.	Misleading
#48	18	3	especially with poor quality prints due to increased accuracy of **the search.**	especially with poor quality prints due to increased accuracy of **image processing and matching** algorithms.	Clarification:	Clarification
#49	18	3	Vendors are also starting to use ensemble methods to bundle multiple search algorithms to generate candidate lists.	Delete (or at the very least reword: "Vendors **use fusion** methods to **combine** multiple search algorithms to generate candidate lists.")	The term is "fusion", not ensemble methods. Vendors have used multiple matching algorithms for decades, are not "starting to use" them.	Incorrect
#50	18	4	It is possible that at some point, these search algorithms will become so refined in their ability to read latent print images that they may eliminate the need for human encoding in most cases, which would likely speed up the latent print search process.	Image-only searches, in which no human encoding is necessary, have been available for years, but were far less accurate than feature-based searches (such as those using EFS features). In the newest AFISs (including NGI), accuracy for image-only searches is approaching that of feature-based searches (e.g. using EFS features). Use of image-only searches will speed up the latent print search process.	Latent image searches (aka image-only searches) have been available since the beginning of IAFIS. In the past, they were far less accurate than feature-based searches. Now (with the best new AFISs, including NGI) image-only searches are nearly as accurate as feature-based searches. As the accuracy of image-only searches increases, interoperability becomes simpler because systems can exchange images (as with 10-prints) and ignore features (less need for EFS). We are not there yet, but a simpler-but-lower-accuracy interim interoperability solution would be to enable image-only searching.	Incorrect

#51	18	4 (bottom of paragraph)		Add sentence: Ongoing research is investigating methods for more effective candidate list management, including algorithms to limit the number of candidates reviewed, and fusion of multiple candidate lists.	Candidate list management, including list size reduction, is necessary in order to manage the reviewer workload.	Clarification
#52	19	1	An alternative to the current multiple AFIS databases would be a system whereby all law enforcement agencies in the United States submit every latent print to a central repository of biometric information, within the bounds of standardized privacy laws.		To a certain extent, that is already what NGI is: the FBI does not own its fingerprint and criminal history data, but holds it on behalf on the states. The reason that it does not have every print, and the reason that states (and some localities) want their own systems and data is federalism. I can see why you might want to say that bluntly, but you may wish to allude to it.	Minor point
#53	20	1	features encoding standard to be incorporated in the **2013 update of the** ANSI/NIST-ITL **1-2011** standard.	features encoding standard to be incorporated in the ANSI/NIST-ITL standard.	The purpose was to incorporate into the ANSI/NIST-ITL standard, not a particular update of that standard. The 2013 reference is completely incorrect: EFS was added in 2011.	Incorrect
#54	20	1	EBTS has been incorporated in major systems including NGI **and systems of INTERPOL and DOD**.	EBTS has been incorporated in **NGI and DOD's ABIS**.	Interpol's INT-I is very different from EBTS	Incorrect
#55	20	1	NIST testing of the EFS has demonstrated that it provides the basis for a common set of features that all major vendors can use.	Add footnote citing the NIST testing mentioned in the text - Indovina, M, R. A. Hicklin, and G. I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets, Evaluation #1." NISTIR 7775. March 2011. - Indovina, M., V. Dvornychenko, R. A. Hicklin, and G. I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets, Evaluation #2." NISTIR 7859. May 2012.		Clarification
#56	20	2	LITS **requires that** latent print submissions include transactional meta-data, the latent print image, and **minutiae** data.	LITS **defines** the transactional meta-data, latent print **imagery,** and **EFS feature** data **to be included in latent print submissions**.	Not all transactions require images, nor minutiae.	Incorrect

#57	20	3	The LITS designates two different sets of features called "profiles" to be interoperable across all systems: the image-only search and the quick minutiae search.	The LITS designates two different sets of features called "profiles" **that are required across all** **interoperable** systems: the image-only search and the quick minutiae search.	LITS defines multiple profiles, two of which are required.	Minor point
#58	20	3	These profiles are vendor-neutral and can be used across systems that have adopted the LITS.	These profiles are vendor-neutral and can be used across systems that have adopted the LITS **or are compatible with EBTS (NGI).**	A system compliant with EBTS can use these whether or not they explicitly adopt LITS.	Misleading
#59	20	3	Additional information can be encoded to be used by specific vendors or future systems by submitting additional markup details through set profiles (Table 2).	Additional information can be encoded to be used by specific vendors or future systems by submitting additional markup details through **optional LITS** profiles (**such as the detailed markup profile shown in** Table 2).	The detailed markup profile shown in Table 2 is one of several optional profiles, not the only one as implied.	Misleading
#60	21	1	As of September 2014, few law enforcement agencies had purchased LITS-compliant **workstations**	As of September 2014, few law enforcement agencies had purchased LITS-compliant **systems**	They would need complete systems (servers and workstations), not just workstations.	Incorrect
#61	21	2	In the interim, a **small** subset of law enforcement agencies are using the ULW to support their interoperability needs.	delete "small"	Depends on what "small" means: it's in over 100 locations in Texas alone	Minor point
#62	21	2	The ULW software is freeware provided by the FBI that can run on most computers and **that has been updated to allow the examiner to encode using the interoperable LITS format.**	The ULW software is freeware provided by the FBI that can run on most computers **that allows the examiner to encode using interoperable EFS features.**	ULW implements EBTS not LITS per se. "Has been updated" isn't quite right: EFS was implemented in ULW six years ago.	Incorrect
#63	21	Footn ote 39	As mentioned in the previous section, the estimated average age of the AFIS is approximately 6 years old. (LFIOS, Question 25).	As mentioned in the previous section, the **AFIS was upgraded or became operational an average of 6 years ago.**	It was better stated on p17: "average age" implies time since a new system was acquired, when in many/most cases, this is the time since the last upgrade.	Minor point
#64	21	Table 2	Table 2. EFS Profiles that are required by LITS and optional additional EFS profiles supported by LITS	Table 2. EFS Profiles that are required by LITS and **an example of an optional** EFS **profile** supported by LITS	The detailed markup profile shown in Table 2 is one of several optional profiles, not the only one as implied.	Misleading
#65	23	4	and the Law Enforcement Enterprise Portal (LEEP), formerly the Law Enforcement Online network.	and the Law Enforcement Enterprise Portal (LEEP**,** formerly the **LEO** Law Enforcement Online network**).**	as written, it was unclear whether the "formerly" applied just to LEEP or the whole sentence. Many users who know LEO don't know what it stands for, so include the acronym.	Minor point
#66	27	4	In order to respond to the demands for standardized training, NIST has developed an EFS online training	In order to respond to the demands for standardized training, NIST in cooperation with FBI BCOE have developed an EFS online training	FBI BCOE initiated this effort.	Clarification

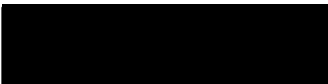| #67	29	5	For example, **Florida State police** were hesitant to search NGI for a suspected drug kingpin charged with Federal crimes who was being held in a local jail.	For example, **State or local police may be uncertain whether they are permitted** to search NGI for a suspected drug kingpin charged with Federal crimes who **is** being held in a local jail.	This would need a lot more detail than appropriate to make this correctly refer to the instance in question, starting with "Florida Department of Law Enforcement", not "Florida State Police." I advise making it generic (as suggested) or deleting the sentence.	Incorrect
#68	33			Add references for the 2011 and 2013 versions of the ANSI/NIST-ITL standard (note that the name and report numbers have changed since 2000)		Clarification
#69	33			Add to References - Indovina, M, R. A. Hicklin, and G. I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets, Evaluation #1." NISTIR 7775. March 2011. - Indovina, M., V. Dvornychenko, R. A. Hicklin, and G. I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets, Evaluation #2." NISTIR 7859. May 2012.		Clarification

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MITRE Response to OSTP "Forensic Science report on achieving latent fingerprint interoperability" RFI

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Introduction

The MITRE Corporation is a not for profit company that runs Federally-Funded Research and Development Centers (FFRDCs) for the U.S. government. MITRE's FFRDCs serve agencies in a variety of areas that impact the public in direct and indirect ways, such as national security; aviation safety and administration; tax administration; homeland security; healthcare; benefits services; cybersecurity; and other missions.

We are pleased to respond to your RFI requesting comments on the draft report *Achieving Latent Fingerprint Interoperability in the United States* based on our broad perspective gained from serving a variety of government missions, and from the unique perspective of a systems engineering company that combines a strong research base with an informed awareness of the larger policy and contexts in which government operations are conducted.

MITRE Comments on Draft Document

Addressing AFIS interoperability issues raised in the 2009 National Research Council report, "Strengthening Forensic Sciences in the United States: A Path Forward", was an important task of the NSTC's Subcommittee on Forensic Science, and MITRE is thankful that a summation of that work is being published for public consumption. This work is important not only for the public record, but also to inform acquisition programs, researchers, system designers, and policymakers into the future. MITRE was not privy to internal Subcommittee activities, but has provided FFRDC support to multiple federal agencies on latent fingerprint issues. Insight gained from these activities lead us to believe that the draft report could be enhanced in a few different areas, as discussed below.

Current Interagency Interoperability. MITRE believes that the current draft document does not discuss State-to-Federal nor Federal-to-Federal interoperability activities and concerns with the same level of fidelity as it did State-to-State interoperability. In particular, the volume and timeliness of such interactions and their criticality in meeting national security and justice needs is absent. Likewise, more could be said on how standards conformance is achieved when systems are acquired and fielded by different organizations using different planning and budgeting processes. Full conformance to existing standards can be a challenge when budgets are limited and the pace of the mission increases[1]. However, recent developments in machine-readable tables, more broadly available conformance tools, and continued interoperability testing initiatives will help the situation. The draft acknowledges the benefits of automation and accuracy provided by common representations. Additional metrics or planning could be suggested against actual systems, information security environments, and sharing objectives.

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[1] Standards conformance consists of several layers; field level, semantic consistency, and data quality and correspondence. Achieving field level conformance is necessary, but ultimately not sufficient for achieving consistently high accuracy and automation between two or more systems.

Governance. The draft report correctly discusses variance in governance restrictions as a hurdle for interoperability. Indeed, in many cases the layers of policies in play are a greater hurdle than the technical limitations discussed. MITRE believes that the recommended research topics in the report are valid, but will be limited in their effectiveness unless a detailed collection and assessment of vertical and horizontal sharing policies (at all levels) is first developed. A holistic collection of the critical elements in these policies, along with their drivers and actions required to overcome them, is necessary before potential activities to overcome them can be properly developed and prioritized. This information would also be extremely helpful in educating law enforcement agencies' stakeholders on the importance of upgrading their systems so that local missions can succeed. Absent this, it will continue to be difficult to convince these stakeholders that adjustments in policies and funding are required. While the report does mention a potential Office of Justice Programs analysis along these lines, it should be raised in stature, depth, and purpose. The purpose would be to model and represent federated access control and authorization systems in bi-directional, human readable, and machine-readable forms. One of the obstacles is that some policy language is challenging to codify against information systems, particularly as they cross jurisdictions, security missions, and information security domains. Moreover, standards and sharing agreements can take years to develop and adopt — policy and systems must adapt more quickly as conditions and risks change.

Research Data.   One of the hurdles in advancing both latent system capability and multi-system interoperability is the lack of representative datasets for research purposes. This situation is compounded by limited access (and comparative analysis) to subsystems and processing components residing within closed architectures. Advances in science and technology are enabled, understood, and applied through challenge data designed to represent interoperability issues. Examples of interoperability issues that are intrinsic to the data include latent fingerprint quality, matchability against major AFIS systems, and the cognition and interpretation by human examiners with varying levels of training and experience. Historically, latent fingerprint processing and analysis was conducted almost exclusively against "rolled" fingerprints and "full case prints" as traditionally collected by law enforcement agencies. With the rapid adoption of "identification slaps" by DHS, mobile collection devices being used by multiple agencies, forensics being collected for DoD missions, and emerging "contactless fingerprint" technologies being tested, there are additional interoperability challenges that are not yet adequately represented in research datasets. A bigger-picture perspective where data is collected for these broader developmental purposes is needed.[2]

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[2] For example, consider the data collected for the NIST-led Face Recognition Grand Challenge: http://www.nist.gov/itl/iad/ig/frgc.cfm. This research, in conjunction with representative data, public and sequestered, used in the Face Recognition Vender Tests provided enormous insight into performance and first order factors that degrade performance.

Conclusion

MITRE recognizes the challenges of interoperability raised in the draft, and looks forward to the final report. We feel the areas mentioned could be enhanced and would advance the continued cause for achieving latent fingerprint interoperability in the United States, and impact the direction and focus of future R&D investments. MITRE is available to discuss any of the recommendations in more detail if desired.