

# Defense Forensic Science Center

## A New Paradigm for Fingerprint Reporting . . . *Without Individualization*



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# Overview

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- Revised DFSC Reporting Language for Latent Print Testimony and Reports
  - *What* was changed?
  - *When* was it changed?
  - *Why* was it changed?
  - *How* has it been received by the legal community?



# DFSC Information Paper



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CIFS-FSL-LP

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## INFORMATION PAPER

SUBJECT: Use of the term "Identification" in Latent Print Technical Reports

1. Forensic science laboratories routinely use the terms "identification" or "individualization" in technical reports and expert witness testimony to express the association of an item of evidence to a specific known source. Over the last several years, there has been growing debate among the scientific and legal communities regarding the use of such terms within the pattern evidence disciplines to express source associations which rely on expert interpretation. Central to the debate is that these terms imply absolute certainty of the conclusion to the fact-finder which has not been demonstrated by available scientific data. As a result, several well respected and authoritative scientific committees and organizations have recommended forensic science laboratories not report or testify, directly or by implication, to a source attribution to the exclusion of all others in the world or to assert 100% certainty and state conclusions in absolute terms when dealing with population issues.
2. The Defense Forensic Science Center (DFSC) recognizes the importance of ensuring forensic science results are reported to the fact-finder in a manner which appropriately conveys the strength of the evidence, yet also acknowledges that absolute certainty should not be claimed based on currently available scientific data. As a result, the DFSC has modified the language which is used to express "identification" results on latent print technical reports. The revised languages is as follows:



# Identification



## “Identification”:

*The determination that there is sufficient quality and quantity of detail in agreement to conclude that two impressions originated from the same source.*

*Identification of an impression to one source is the decision that the likelihood the impression was made by a different source is so remote it is considered as a practical impossibility.*



# Association



## “Association”:

*The conclusion that the two impressions have corresponding ridge detail and, in the opinion of the examiner, the likelihood of observing this amount of correspondence when made by different sources is considered extremely low.*



# DFSC Reporting Language



- Standardized language used in LP testimony and reports – Effective 03 Nov 2015:
  - *"The latent print on Exhibit ## and the finger/palm print standards bearing the name XXXX have corresponding ridge detail. The likelihood of observing this amount of correspondence when two impressions are made by different sources is considered extremely low."*



# Why?

Did you  
hear ... !?

What? ...  
Why? ...  
Oh my!



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# Why?



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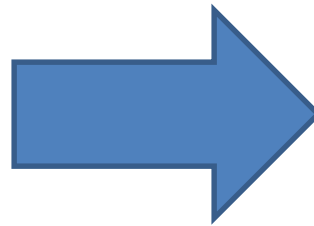


# Why?

- Lets take a journey . . .
  - Premise of fingerprint identification and challenges
  - Evolution of LP reporting practices
  - Critical issues with the current paradigm
  - Moving forward: Ensuring the reporting framework is compatible with emerging statistical approaches



# Premise of Fingerprint Identification



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# The Logic . . .



Friction Ridge Skin is  
considered unique

THEREFORE, fingerprint  
impressions are considered  
unique

THEREFORE, matching prints  
can be attributed to a single  
source



# The issues . . .

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- Do we limit our examinations to ONLY those prints having a full reproduction of friction ridge skin?
- How much detail is necessary to become “unique”?
- At what point is an individualization or identification conclusion justified?



# The Question . . .

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If we have not proven “uniqueness” at the level of detail available in partial, degraded impressions routinely observed in casework . . . should we report our conclusions in a framework which states or implies absolute source attribution to a single individual?





## The Pickle . . .

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# How can we dill with our pickle?





# The Evolution of Fingerprint Reporting

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## TWGFAST (1998):

“Identification” – The determination that two corresponding areas of friction skin impressions originated from the same person to the exclusion of all others.





# The Evolution of Fingerprint Reporting

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SWGFAST (2003):

~~“Identification”~~ “Individualization” –  
The determination that  
corresponding impressions  
originated from the same person  
source to the exclusion of all others  
(identification).

Cole S. (2014) Individualization is Dead, Long Live Individualization! Reforms of Reporting Practices for Fingerprint Analysis in the United States. *Law, Probability, and Risk* 0, 1-34.



# The Evolution of Fingerprint Reporting

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## *National Academies of Science Report (2009, p.87):*

“[n]o forensic method other than nuclear DNA analysis has been rigorously shown to have the capacity to consistently and with a high degree of certainty support conclusions about ‘individualization’”

NRC (2008). Strengthening Forensic Science in the United States: A Path Forward. National Research Council, Committee on Identifying the Needs of the Forensic Science Community. National Academies Press, Washington, D.C.



# The Evolution of Fingerprint Reporting

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## *Memorandum to IAI members from President Robert J. Garrett (2009)*

“It is suggested that [IAI] members not assert 100% infallibility (zero error rate) when addressing the reliability of fingerprint comparisons”

“. . . [IAI] members are advised to avoid stating their conclusions in absolute terms when dealing with population issues”



# The Evolution of Fingerprint Reporting

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SWGFAST (2009):

“Individualization” – The ~~determination~~ conclusion that corresponding impressions originated from the same source to ~~the exclusion of all others~~ (identification)

Cole S. (2014) Individualization is Dead, Long Live Individualization! Reforms of Reporting Practices for Fingerprint Analysis in the United States. *Law, Probability, and Risk* 0, 1-34.



# The Evolution of Fingerprint Reporting



## SWGFAST (2011) [Current]:

“Individualization” – The ~~conclusion~~ decision by the examiner that there are sufficient features in agreement to conclude that two areas of friction ridge impressions originated from the same source. Individualization of an impression to one source is the decision that the likelihood the impression was made by another (different) source is so remote that it is considered as a practical impossibility.



# Analysis of the Current Paradigm

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## The current Identification / Individualization

- “Individualization” is defined as a “decision” rather than an expression of the weight of the evidence
- Source associations are recognized to have a probabilistic underpinning and some uncertainty associated with a single source attribution



# Analysis of the Current Paradigm

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## BUT . . .

- Statements of “identification” or “individualization” require the analyst to evaluate the probability of another source against an undefined theoretical threshold to be considered “practical impossibility”
- . . . Then we disregard that probability and simply report a single source attribution
- To the fact-finder . . . the current reporting paradigm maintains the implication of absolute certainty



# Critical Issues of the Current Paradigm

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## The Critical Question . . .

Is it appropriate for the analyst to state "*the two impressions originated from the same source*", which carries the implication of "*a source attribution to the exclusion of all others*"?





# Critical Issues of the Current Paradigm

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NIST (2012, p.72):

**Recommendation 3.7:** “Because empirical evidence and statistical reasoning do not support a source attribution to the exclusion of all other individuals in the world, latent print examiners should not report or testify, directly **or by implication**, to a source attribution to the exclusion of all others in the world.”

NIST (2012) Latent Print Examination and Human Factors: Improving the Practice Through a Systems Approach. Expert Working Group on Human Factors in Latent Print Analysis, U.S. Department of Commerce, National Institute of Standards and Technology.

# Critical Issues of the Current Paradigm



## NIST (2012, p.73):

“[g]iven that the word “individualization” has been associated precisely with the “to the exclusion of all others” claim of universal individualization based on a premise of general uniqueness, it is potentially problematic and confusing to attempt to redefine it by fiat. Using alternative terminology might be a superior solution to attempting to “legislate” a new and slightly modified meaning to a much criticized term and theory.”



# Critical Issues of the Current Paradigm

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# Critical Issues of the Current Paradigm



**. . . And another problem . . . Lets get technical!**

- Statistically speaking, an “identification” is an expression of a very high probability (“p”) that the two impressions were made by the same source, given the corresponding ridge detail, written:

$$p(S | E)$$

Where “S” = “Same source”, “E” = corresponding ridge detail, and “|” = given or conditioned upon



# Critical Issues of the Current Paradigm



... **And another problem . . . Lets get technical!**

- BUT, when we perform our examinations, what we are *actually* assessing is:
  - The probability (“p”) of the corresponding ridge detail under conditions when two impressions were known to have been made by the same source and when two impressions were known NOT to have been made by the same source . . . written:

$$p(E|S) \text{ and } p(E|DS)$$

Where “S” = “Same source”, “DS” = “Different source”, “E” = corresponding ridge detail, and “|” = given or conditioned upon



# Critical Issues of the Current Paradigm



... **And another problem . . . Lets get technical!**

- Statistically speaking, what we can demonstrate is not necessarily compatible with what we are saying . . .

$$p(E|S) \neq p(S|E)$$

*And*

$$p(E|DS) \neq p(DS|E)$$

Where "S" = "Same source", "DS" = "Different source", "E" = corresponding ridge detail, and "|" = given or conditioned upon

# Critical Issues of the Current Paradigm



... **And another problem** ... **Lets get technical!**

- Emerging statistical models are only able to quantify:

$$p(E|S) \text{ and } p(E|DS)$$

So if we continue to report "identification", which is:

$$p(S|E)$$

What we say and what the statistical models can demonstrate quantitatively will not be the same thing!

Where "S" = "Same source", "DS" = "Different source", "E" = corresponding ridge detail, and "|" = given or conditioned upon



# Why?

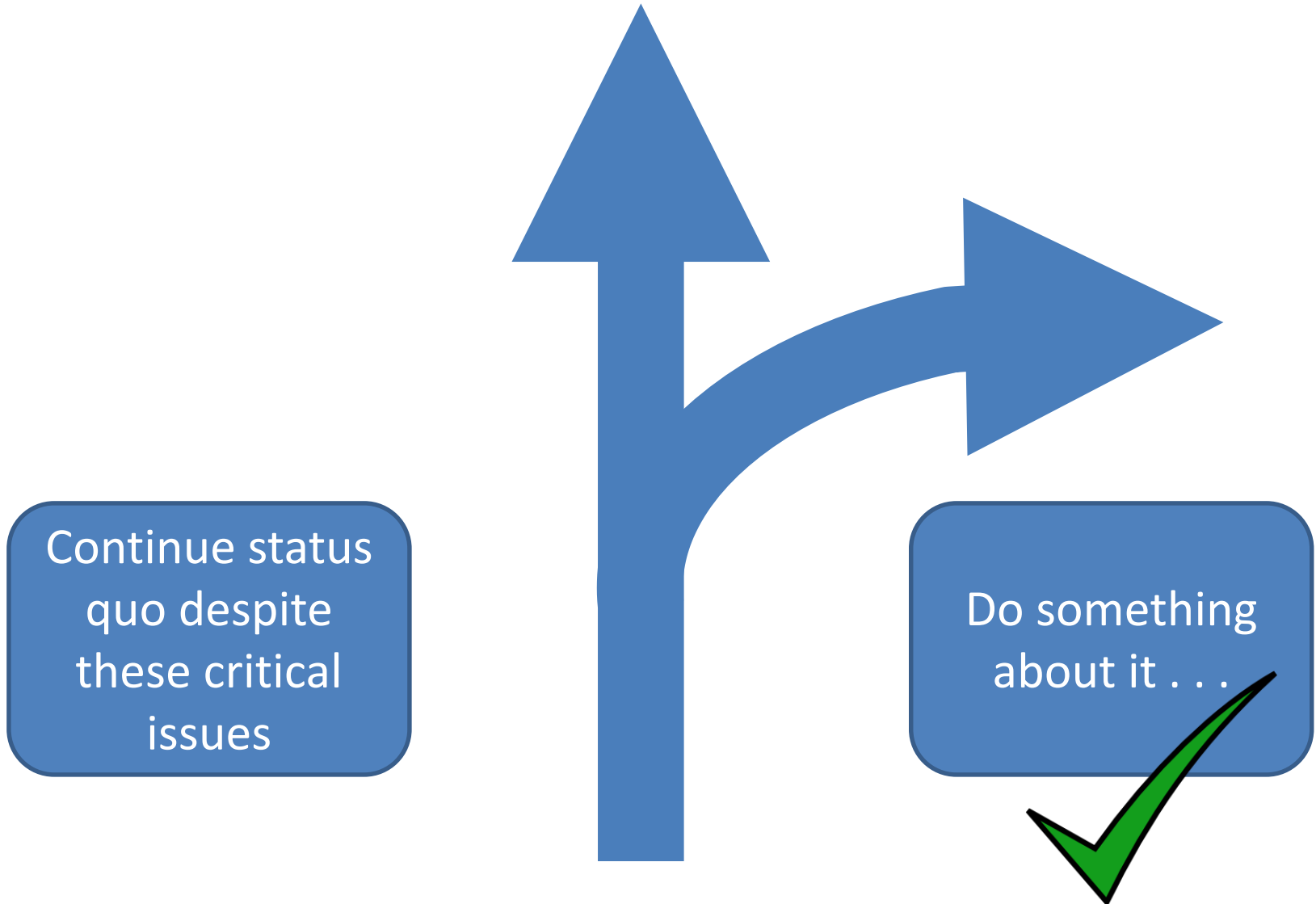


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# Moving Forward





# Moving Forward



*How will DFSC reports and testimony differ from the rest of the community?*



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# Moving Forward



## Comparison of DFSC Reports and Testimony to rest of Latent Print Community:

- Everything is exactly the same . . . Except:
  - DFSC latent print reports or testimony will NOT state "*the two impressions were made by the same source*"
- We perform our examinations just like everyone else . . . We simply differ in how we express our findings



# Moving Forward

*What has been the impact to cases?*



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# Moving Forward



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# Nothing . . .

Understanding our reports isn't rocket science



# Moving Forward



*What's next?*



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# Moving Forward

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## Next steps for DFSC:

- Pilot implementation of an internally developed statistical model to measure the observed correspondence between two impressions (Fall 2016)
- Estimate the probability of observing the measured correspondence among impressions known to have been made by the same source and among impressions known to have been made by different sources
- Report the weight of the association in quantitative terms with data to demonstrate the significance of the conclusion



# Moving Forward

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## Next steps for the Latent Print Community:

- Make the model available for widespread use
- Transition the software to the commercial marketplace for professional manufacture, distribution, and support
- Provide support to the friction ridge community, as needed, during this time of transition





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