LIVESCAN RECORDS

A POTENTIAL ISSUE FOR THE FINGERPRINT COMMUNITY

Introduction

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  (Latents)

Introduction

- What do you do when the known record you search and/or compare against has not been recorded accurately?

Case History #1

- March 27, 2005 a Residential Burglary took place in Aurora, Illinois.

- The only AFIS suitable latent print in the case was recovered from an exterior window.

Case History #1

- An AFIS search results in the LP Examiner calling for a fingerprint card on the second candidate in the Latent inquiry candidate list.

- The examiner receives a transmitted livescan card from the ISP AFIS archive database.

Case History #1

- The following images depict the Latent impression followed by the received livescan tenprint record for the rolled Left Thumb.

Illinois State Police

FOR AGENCY/LABORATORY USE ONLY

DATE RECEIVED: _____

RECEIVED BY: _____
(SIGNATURE OF PERSON THAT RECEIVED RECORD)

RECEIVED FROM: _____
(NAME OF AGENCY RECORD WAS RECEIVED FROM)

NOTES:

LAST NAME, FIRST NAME, MIDDLE NAME, SUFFIX [redacted]

DATE OF BIRTH: MM DD YY	SEX	RACE	HEIGHT	WEIGHT	EYES	HAIR
[redacted]	[redacted]					

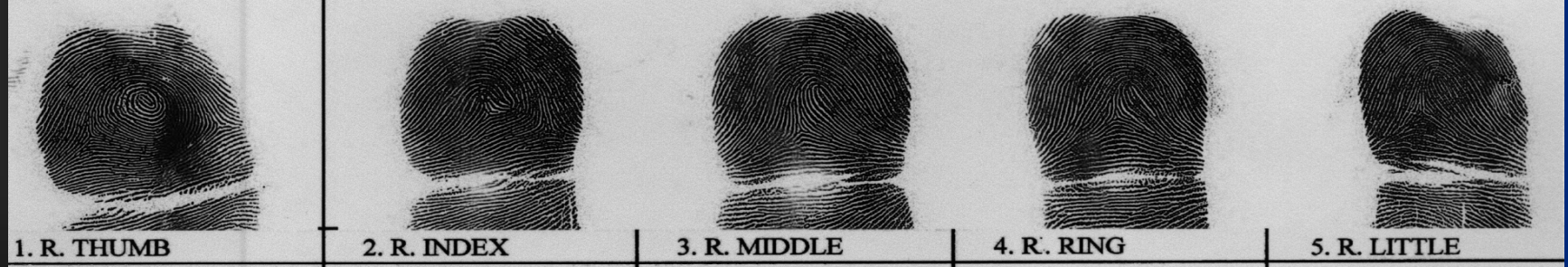
SOCIAL SECURITY NUMBER	FBI NUMBER	STATE IDENTIFICATION NUMBER
[redacted]		[redacted]

ORI IL0450100
CONTRIBUTOR
ADDRESS

AGENCY IDENTIFICATION NUMBE

NAME OR NUMBER OF OFFICIAL TAKING FINGERPRINTS

DATE PRINTED: MM DD YY [redacted]



1. R. THUMB | 2. R. INDEX | 3. R. MIDDLE | 4. R. RING | 5. R. LITTLE

6. L. THUMB | 7. L. INDEX | 8. L. MIDDLE | 9. L. RING | 10. L. LITTLE

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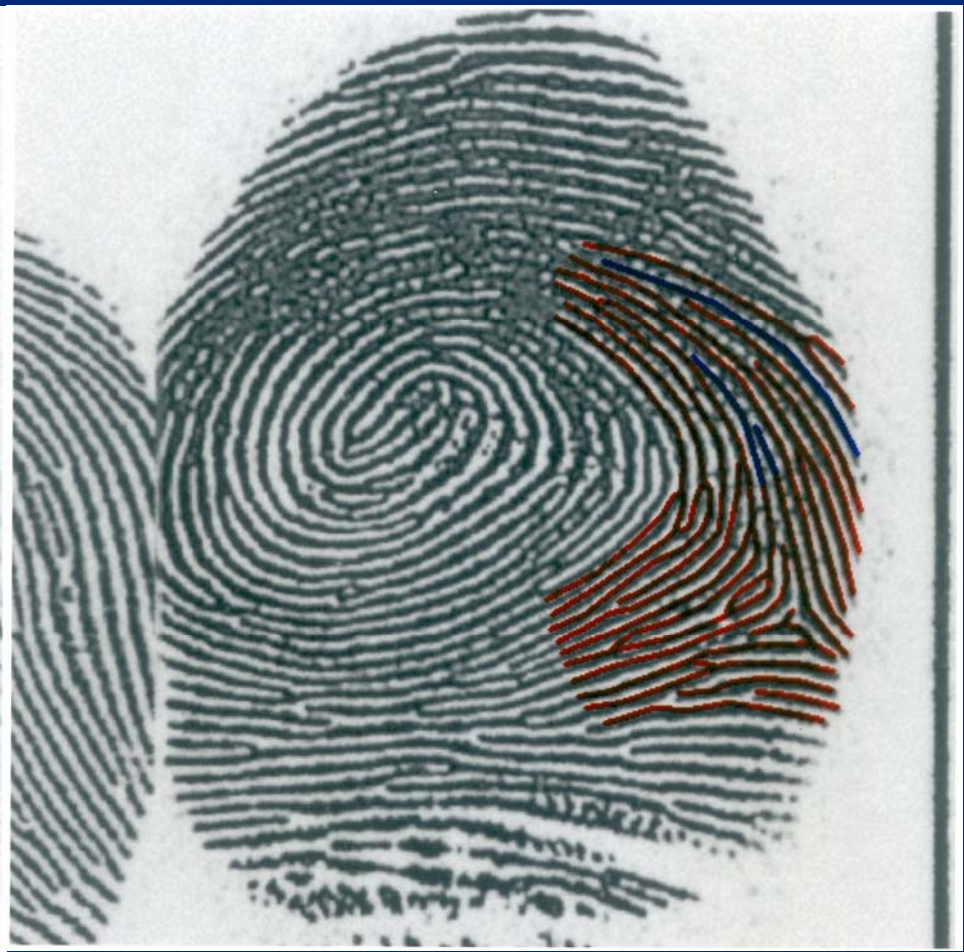

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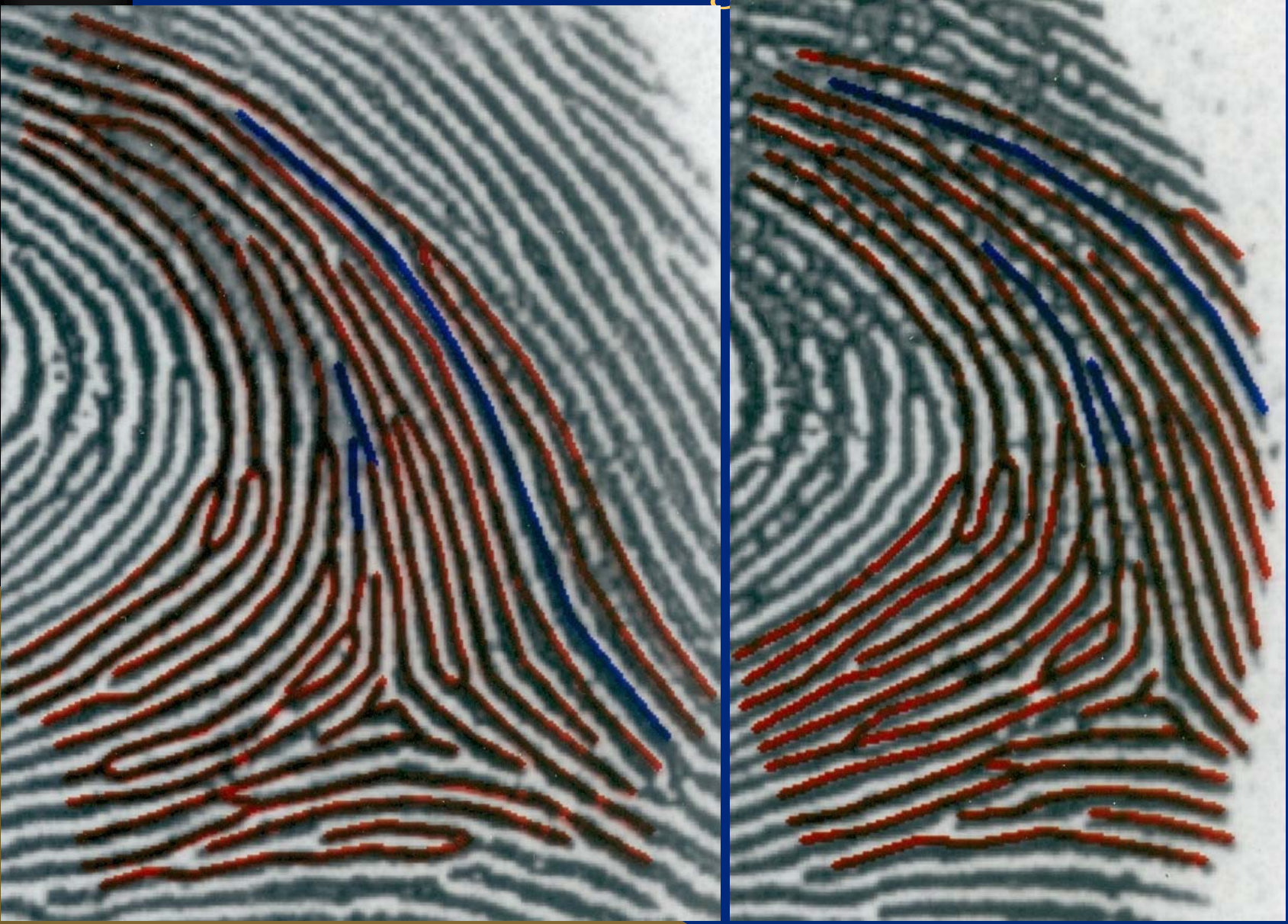

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We examined the other records from our Archive database for this individual and no other record showed this anomaly.

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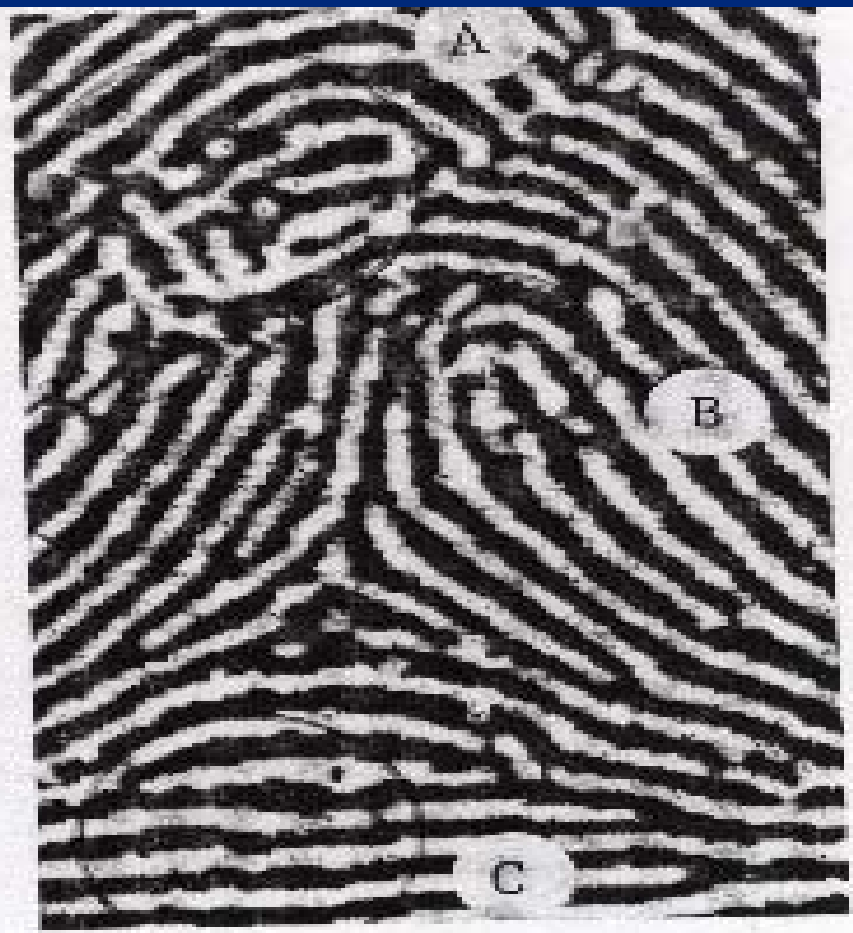
- If the inaccurate known record is part of the RDB-L, it will negatively impact all AFIS searches against it.
  - False minutiae can effect search scores, but the effect is minimized by zoning and limited to the certainty of that particular minutiae
  - When a non-existent ridge has been created and has formed false minutiae, the negative effect is magnified because it changes the relationships of all the minutiae in that quadrant effecting the certainty values of every minutiae which in turn significantly reduces the search score.

Previous research

- Research on the quality of livescan devices has been going on since the onset of their use.
  - James M. Duggan Jr. and Garold C. Warner, “A Preliminary Minutiae Accuracy Analysis of Electronic Fingerprint Recording”, Journal of Forensic Identification, Vol 38, 1988 pg 285-291

Their research examined three livescan devices and compared them against inked standards. They found that 23.9% of the images evaluated from the livescan generated standards had some sort of anomalous formation (minutiae being dropped or falsely generated.

inked



live scan

Fig. 5. Comparison of minutiae features, inked vs. live scan. A. reproduction of scarred area; B. dropped and false minutiae; C. flexure crease.

Related research into livescan quality

- The 2005 MITRE report (section 2.6.1) on verifying IAFIS image quality requirements states,
  - "Artifacts or anomalies detected on the fingerprint images, due to the scanner or image processing, shall not be significant enough to adversely impact support to the functions of conclusive fingerprint comparisons (identification or non-identification decision), fingerprint classification, automatic feature detection, or overall AFIS search reliability."

The livescan vendor in question was contacted for an explanation

- Two responses were received
  - The initial response was: “Our first impression is this issue is the result of technique – it looks as if the subject did not press hard on the flat image.”
    - They were informed that the flat image was the correct one and the rolled image was the one with concerns.

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    - They were informed that the flat image was the correct one and the rolled image was the one with concerns.
  - The vendor’s engineering department reviewed the issue further. and issued the following statement: “Several of the TP-600 images exhibit smears that are a function of uncontrolled motion of the finger during rolling of the finger. Above the delta presents visual cues that lateral motion of the ridge structure has occurred during the rolling process.”

Issues with the livescan vendor's explanation

- There appears to be no clear area of lateral motion, only an area of extra pressure that would commonly be attributed to overpressure if it were an inked print. Furthermore, overpressure is not known to create a non-existent formation.

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- There appears to be no clear area of lateral motion, only an area of extra pressure that would commonly be attributed to overpressure if it were an inked print. Furthermore, overpressure is not known to create a non-existent formation.
- In order to more fully explore this issue, the initial concerns along with the livescan vendor's response were forwarded to others within the forensic community to solicit their responses and opinions

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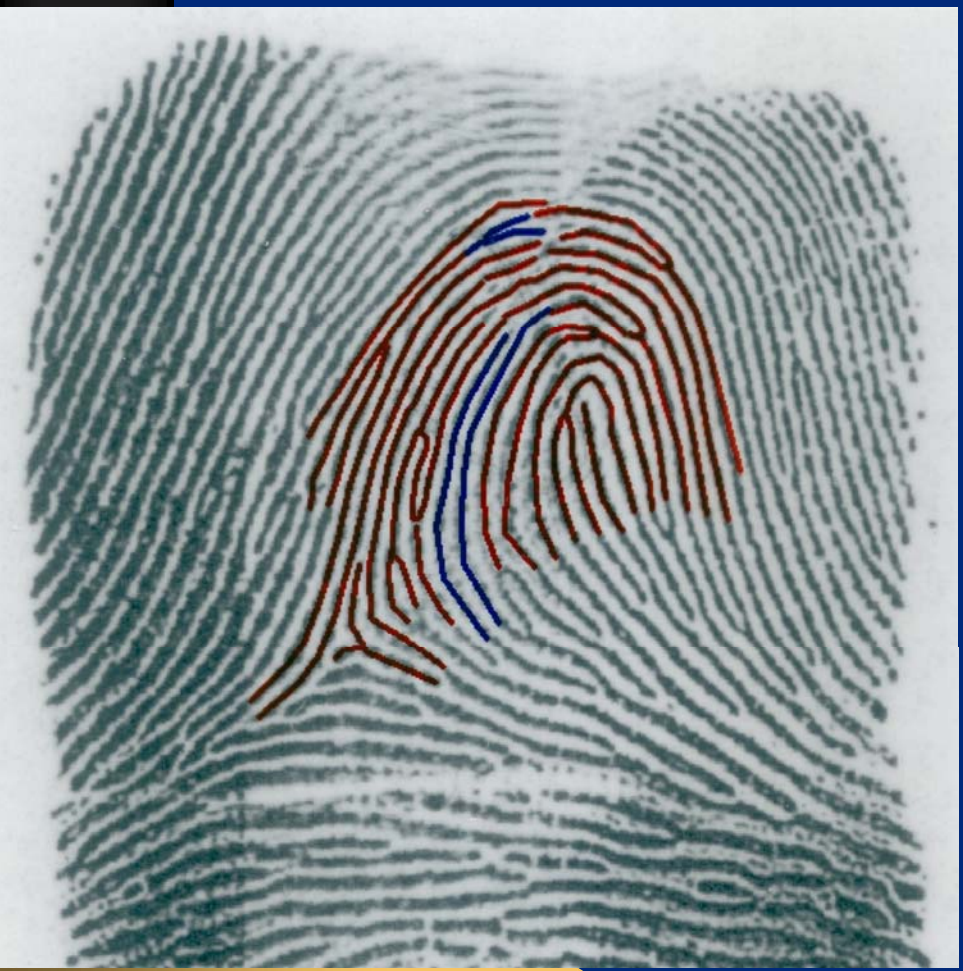
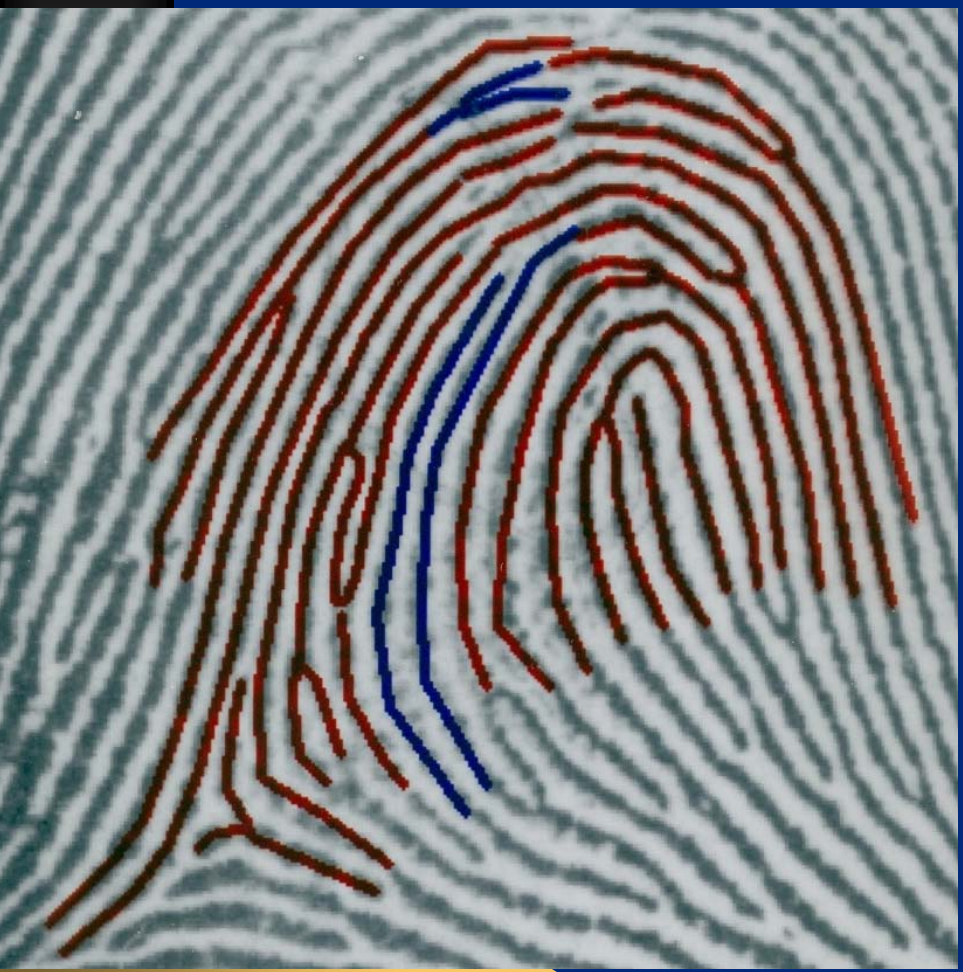
- The responses received all appeared to be consistent.
- The issue seems to be centered primarily within the livescan devices.
  - The resolution of the capturing device
  - Post capture filtering (like stretching) / re-sampling
  - Image stitching
  - Image compression.

In preparing for this talk, we came across a second case





What This All Means

- **Be concerned**
  - Be aware that these issues have occurred and be mindful of similar instance happening within your own agency.

What This Means

- Both of these cases were discovered as the result of AFIS searches. In the first case, the RDB-L had used a different record for the FE that correctly depicted the finger in question. This was not the case for the second event. The record in the RDB-L had to be substituted with another card's correctly depicted ridge detail.

Future Inquiry

- I would like to determine how often this may be happening by asking all of you to go back to your respective departments and inquire if your examiners have experienced anything like this.

Future Inquiry

- I would also like to have a uniform response to livescan vendors relaying the community's concern and what plans they have to work towards quality improvements.

Thank you for your time

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