# AFIS: How to Get More Hits

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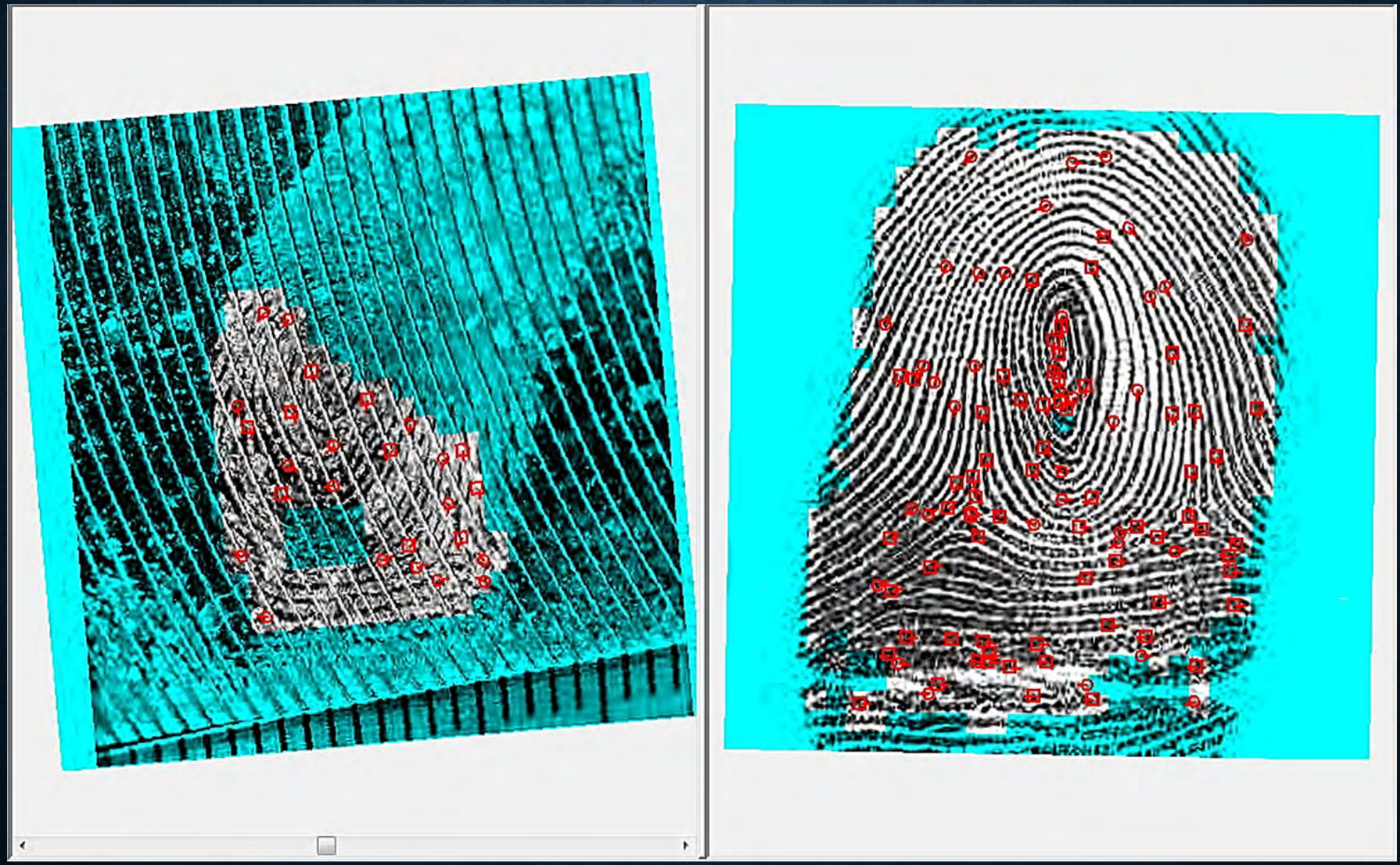
# Overview

- Tips and tricks to increase search accuracy
- Philosophies/methods of searching
- AFIS quality assurance measures
- Questions for the group
  - What type of agency (local, state, etc)
  - What databases in use
  - How many years on the job

# Background

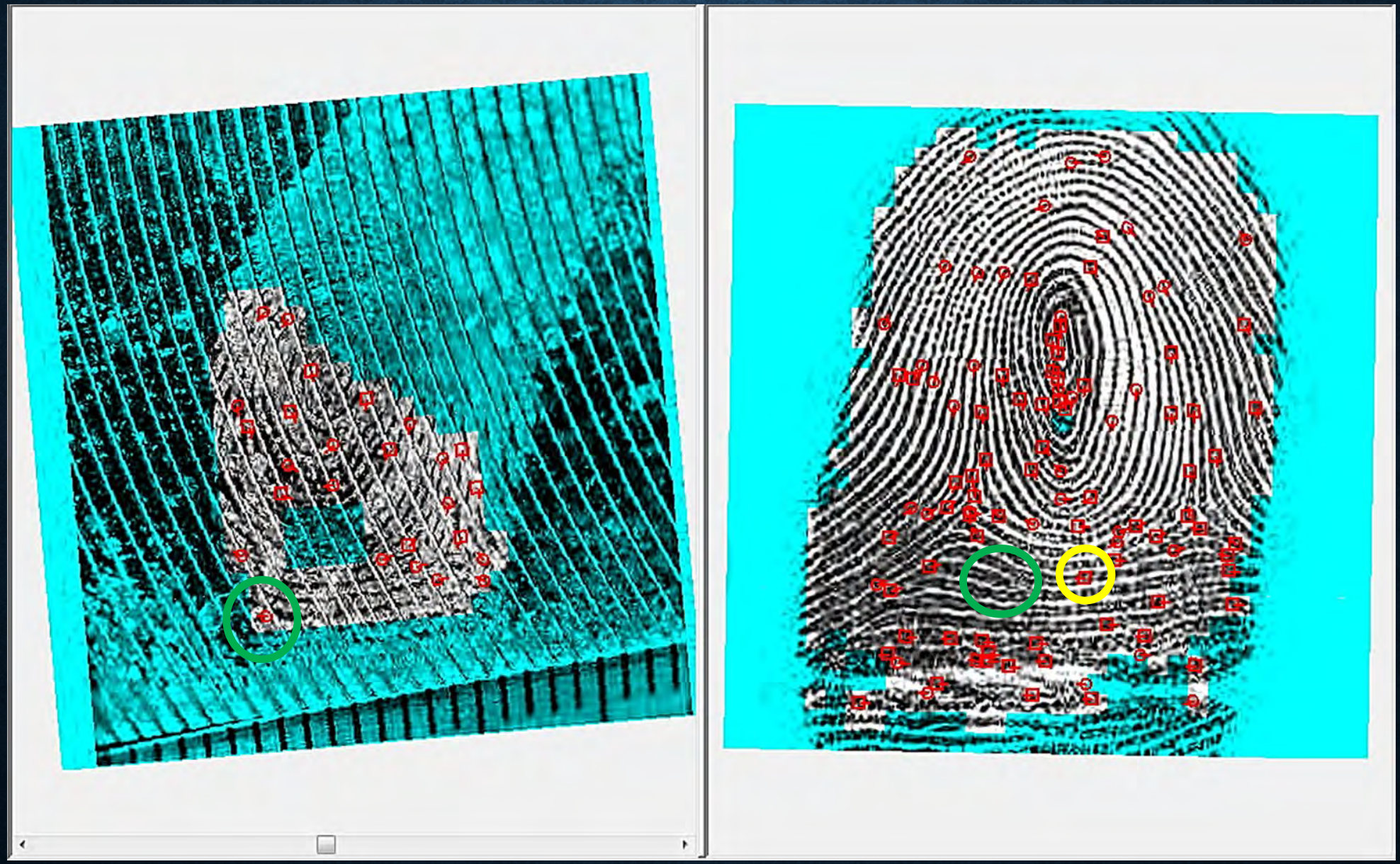
- 2017: Conducted year-long research project on the accuracies of three AFIS databases
  - Access to local, state, and FBI
  - Decreased hit rate in one = suspicion that old searching methods were no longer working
  - How to know if my searches were missing, or if the subject just wasn't there?
  - Test –
    - search all latents in all databases
    - Find markup of known in database that didn't hit, compare it to markup of latent

- Mark up of latent and mark up of known

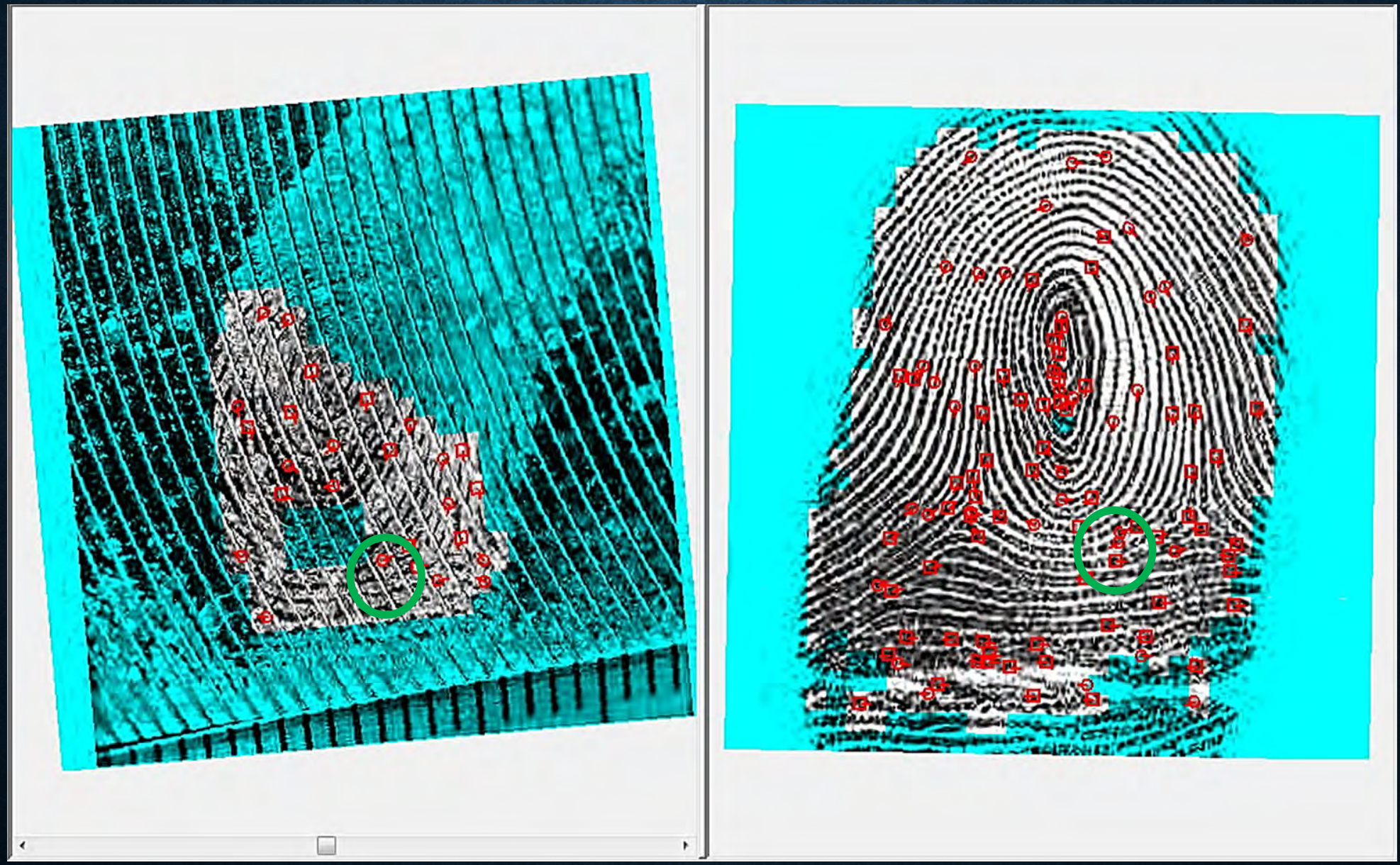


- Erroneously marked features in core area

- Feature in wrong location



- Latent missing two features



# Background

- Re-ran latent, changing one factor at a time
  - Zoned out core area and re-ran it
  - Zoned core back in, added one of the features near the delta…then both
- Then did combinations of corrections
- Point was to find out which factors of a mark-up had the greatest amount of impact on a search, to get more hits in the future

# Background

- Learned valuable lessons from this project
  - What aspects of a markup have the greatest impact on a search
  - Overall procedural changes to make workflow more efficient
  - Quality assurance measures to implement to decrease the chance that searches miss

# Background

- Those lessons are presented here, broken into three categories
  - Examiner discretion factors
    - Marking of features, zoning choices
  - Overall unit procedures
    - Which database to search first, quantity of candidates to ask for
  - Quality assurance testing
    - Thoughts on methods and procedures for testing

# Examiner Discretion Factors

- Referring to manual encoding, or making edits to auto encoding
- Not applicable to searches that are fully auto encoded

# Examiner Discretion Factors

- Core and axis placement
  - Minimal impact on a search
  - When tenprint records are automatically encoded, the software tends to place the core about 2-4 ridges higher than an examiner would
    - If you are uncertain of the core, therefore better to guess high than low
  - Axis – follow flow of ridges at bottom of pattern, if they are visible
  - Placing multiple cores versus expanding the degree of tolerance (not available in all software)
    - Better to use multiple cores if axis is known

# Examiner Discretion Factors

- Zoning (region of interest)
  - Medium impact on search
    - Zoning impact exists because erroneous feature impact is so high
  - Always better to zone out an area than guess at existence of feature
    - Used to not be able always do this, because the print couldn't be separated into multiple pieces
      - Were forced into leaving in areas of uncertainty
    - No longer an issue with newer systems, zone away
  - Leave in areas of continuous ridges

# Examiner Discretion Factors

- Feature marking
  - Large impact on search
  - Two subcategories
    - Marking the opposite type (bifurcation vs. ridge ending)
      - Minimal impact
      - If you know a feature exists, but can't tell the type – zone it out; unable to zone out – better to mark it than leave it as an empty space
    - Missing features & erroneously placed features
      - Very large impact; will move subject significantly down candidate list
      - Missing = your latent has an empty space where the known has a feature marked
      - Erroneously placed = your latent has a feature marked where the known has empty space

# Overall Unit Procedures

- Mandated unit procedures for all examiners to follow when searching AFIS
  - Includes aspects such as how many candidates to ask for, in what sequence to search different databases, etc.
    - For some of you, these may fall under “examiner discretion”

# Overall Unit Procedures

- Quantity of candidates
  - No need to ask for more than 20
    - More efficient to try another database than to re-run with a higher quantity
  - Some agencies go as low as 10 for local databases

# Overall Unit Procedures

- Narrowing from all fingers to a select few
  - Done based on pattern type, or by heights of surrounding latents
  - I was trained to do this first, then open search up to remaining fingers
    - This was the best practice at the time due to the accuracy of the algorithms
  - Algorithms and tech are much better today, no longer necessary
    - I start with all fingers
    - If it doesn't hit, I switch databases
      - This is leading to a higher success rate than taking the time to re-run a latent with a narrowed scope of fingers

# Overall Unit Procedures

- Auto encoded searches versus manual
  - Is it necessary to run a manually encoded search if the auto encoded search doesn't hit? Yes
    - About 25%* of the time an auto search results in a no hit, a follow-up manual search results in an ID
      - Expect this will continue to decrease over the years, but for now it is still worth running a manual search

# Overall Unit Procedures

- Sequence of databases searched
  - Former way of thinking – search the smallest database first, work upward
    - Idea was “Easier to find a needle in a haystack if the haystack is smaller”
    - Search local, then state, then FBI
      - FBI wasn’t routine, it was saved only for major crimes due to the cumbersome nature of the software, limited file penetration, and limit on type of crime
  - No longer the case

# Overall Unit Procedures

- Sequence of databases searched
  - Regarding FBI specifically…
    - Newer software is easier to use
    - No file penetration limit anymore, can search 100% of the database
    - No type of crime limitation, can search any latent from any case

# Overall Unit Procedures

- Sequence of databases searched
  - Starting with a smaller haystack is no longer necessary
    - The technology of today, and the algorithms today are good enough that this isn't as needed as it once was
    - Many agencies are starting with FBI, finding this more efficient
      - All fingers, 2+ pattern types, subject typically within top 5 candidates
      - My research project did not have one instance of a latent hitting in local or state that did not also hit in FBI*

        * Data was limited – do NOT abandon your local and state systems

# Overall Unit Procedures

- Sequence of databases searched, things to think about…
  - Consider agency needs
    - My agency is a tourist county
    - My agency borders towns with high populations of criminals
    - Most of my AFIS hits are to people never before arrested in our county
    - Searching non-local databases first makes sense
  - Consider agency and state regulations
    - My agency has no restrictions on what databases we search
    - My state has no rules against local agencies searching FBI

# Overall Unit Procedures

- Sequence of databases searched, things to think about…
  - How to decide which database to begin with?
  - If we aren't going by size anymore, go by efficiency – which one is the most accurate at the time?
    - Not something I can tell you
    - Test your databases to find out and set up procedures, then continue to test to find out if anything has changed
- Which brings us to…quality assurance

# Quality Assurance Testing

- Databases and searching systems are perpetually changing…
  - Think about the short history of AFIS, and how far we have come
  - Think about how rapidly technology evolves and changes
- …therefore their accuracy and performance ability is also changing
  - Meaning our searching procedures need to be routinely tested, to ensure they are still successful

# Quality Assurance Testing

- Ways to test
  - Will depend on your unit procedures
    - Your procedures state you search all fingers, with 20 candidates, for every latent
      - Run your quality control latent and ensure it is still hitting with those parameters
    - If your procedures state you search all fingers, with 10 candidates for high quality/clarity latents; all fingers with 20 candidates for medium quality/clarity latents; narrowed fingers and 20 candidates
      - Run three quality control latents – one for each of the quality/clarity levels, ensuring that each is still hitting within the designated parameters

# Quality Assurance Testing

- Ways to test
  - Don’t use a rolled print
    - Isn’t accurate to casework
  - Use a latent, one you know has previously hit within your searching parameters
    - Dependent on rules/laws in your area
  - Pick a latent that meets your minimum standards for expectation of hitting
  - Test at least every six months or less

# Quality Assurance Testing

- Make a plan for if a QC test fails
  - What factor will you try changing first? Quantity of candidates? Quantity of fingers searched?
  - Keep changing these things in the sequence you decide, and keep testing until it works
- Because of this – suggest having your manual list searching procedures for different databases separately
  - If one goes down, you don't have to change the way you search ALL of them

# Quality Assurance Testing

- Be adaptable
  - Be willing to change your procedures on a regular basis, perhaps every couple years
- Stay informed and updated
  - Keep up with vendor and any available upgrades, statewide informational broadcasts, FBI informational broadcasts
- Have access to multiple databases

# Quality Assurance Testing

- Why is this important?
  - Story about my state
  - How many crimes don't get solved when our searching procedures and systems aren't working?
  - It's our responsibility to ensure that they are
  - The best system/database today may not be the best tomorrow

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  4) Does anyone wonder how much longer the acronym "AFIS" will last for?
  5) Any questions for me? Or for each other?

# Closing Points & Questions

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